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Cognitive Apprenticeship and the Development of Productive Learning Skills among Emerging Adults Engaged in Mechanic Work in the Informal Sector in Buea Municipality

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ABSTRACT

The study is titled cognitive apprenticeship and the development of productive learning skills among emerging adults engaged in mechanic work in the informal sector in Buea Municipality. Indicators of the study include, coaching, scaffolding, and executive functioning. To find out the extent to which scaffolding impact productive learning skills among out-of-school emerging adults engaged in mechanic work in the informal sector in Buea Municipality. Methodologically, the study design used was quasi-experimental research design. The accessible population of the study was made up of 12 apprentice between the ages 18 to 25 in mechanic garages, and 4 trainers. There were two workshops, 6 apprentices in each workshop. The study took place in Buea in Cameroon in two mechanic garages. The instruments used for data collection were questionnaire, observational checklist and interview guide. The sampling technique was purposive sampling technique. Quantitative data was entered using EpiData Version 3.1 (EpiData Association, Odense Denmark, 2008) and analyzed using the Statistical Package for Social Sciences (SPSS) Standard version, Release 21.0 (IBM Inc. 2012). Data collected from the field were subjected to both descriptive and inferential statistics. For the descriptive data, frequency distribution tables and charts were used to present and describe the data obtained. Cohen's *d* was used to compare assert significant difference of the inferential statistics. For scaffolding at pretest in the experimental group the mean was 9.0 and it rose to 10.4 at posttest. It was recommended that scaffolding should constantly be applied in mechanic garages by the trainers so that apprentice can gain knowledge, aptitudes, skills, competencies and become productive especially at the zone of proximal development where mediation is needed in the form of assistance, self-correction, cues, hints, feedback, directives, demonstration just to name a few.

KEYWORDS: *Cognitive apprenticeship, Scaffolding, Executive functioning, Emerging adults, Productive learning skills*

INTRODUCTION

According to Brown, Collins & Duguid (1989) cognitive apprenticeship is seen as an instructional tool that is aimed at helping novices acquire cognitive skills that involve cognitive processes, interpretation and decision making. Cognitive apprenticeship is seen as an instructional tool that is aimed at helping novice acquire cognitive skills that are concerned with cognitive processes, interpretation and decision making. The cognitive skills derived from cognitive apprenticeship are paying attention in order to stay focus, logical and reflective reasoning via ideas and problem solving, convergent thinking, divergent thinking, critical thinking and processing speed that enable one to perform task quickly. The development of cognitive skills demands a sophisticated learning process and runs inside a human mind (Patel, Kinshuk & Russell, 2002). According to Collins et al., (1989) asserted that cognitive apprenticeship, novices can observe how experts deal with problems in an authentic context and they learn to solve the same or similar problems by "learning through guided-experience" in authentic activities. In fact, experts should put their thoughts and reasons in to words while explaining and demonstrating certain actions such as describing what they are thinking and doing, why they are doing what they are doing, and verbalizing their self-correction processes (Seitz, 1999). In fact, this thinking aloud allows novices to build a conceptual model and acquire an integrated set of cognitive and metacognitive skills through processes of observation (Collins 1999; Collins et al., 1989). Bandura (1997) asserted that learners should pay attention, retain informant by remembering, motor reproduce through practice and be motivated by performing the task and encouraging them through reinforcement in task accomplishment via self-efficacy. Cognitive apprenticeship therefore is a vicarious learning that is learning by observation of others behaviour. Cognitive apprenticeship eventually gives learners the opportunity to explore open-ended topics and develop competency by choosing their own paths toward problem solving. Opportunities for exploration encourage learners to pose their own problem and frame their own questions (Collins et., 1991).

Productive learning skills involve receptive skills that leads to the development of active skills, competency, knowledge, abilities, aptitudes and intelligence through experiences as learners engage in authentic and real-life tasks. Competencies are closely related to the learners' attributes and refer to specific patterns of behaviour that enable someone to perform a task at the required standard. Competencies can be define as a combination of knowledge, skills and attitudes which facilitates the application of knowledge to the real world context (Cook & Weaving, 2013). Accordingly, competency involves the ability to meet complex demands by drawing on and mobilizing psychological resources (skills and attitudes) in a particular context. Emerging adulthood is a proposed as a new conception of development for the period from the late teens through the twenties, with a focus on ages 18 to 25 (Arnett, 1998). Emerging adulthood is meant to describe a new stage for the period between adolescence and adulthood. Importantly, it is not considered a universal life stag, but rather one that have emerged in certain industrialized societies due to social and economic changes that have led to delays in marriage, parenthood, and assumption of other adult roles (Arnette, 2001, 2011).

Background to the study

Historically, in the late 1980S a number of North American Research Centres, Institutes and University Departments working in the fields of cognition and learning, concerns were expressed that current approaches in education were insufficient and a new perspective on the education process was needed. The inefficiency held to exist not only in America but in Western industrialized societies more generally, where there was a great separation between knowledge acquired at school and knowledge required beyond school walls. The how perspective advocated in a series of three key publications aiming to redraw the educational landscape for the 1990s (Brown, Collins, Duguid, 1989; Collins, Brown & Newman 1989; Lave & Wenger, 1991) was embodied in the cognitive apprenticeship model by (Collins & Brown, 1989).

Notwithstanding, in the classroom context, the treatment of skills and knowledge was so abstracted from their uses in the world (Collins et al., 1989). Classroom procedures in the view of Brown et al., (1989) were thus the hollow character of activities, school learning remain hermetically sealed within this culture often has little bearing on performance elsewhere. An example of the research referred here was the ethnographic work of Lave cited in Collins et al., 1989) on traditional and pretraditioanl apprenticeship in the West African State of Liberia. The aspects of Lave's work were identified as being of special interest. First, the sequencing of learning activities in Liberian apprenticeship involved; observation of the master's executing of the target process, attempts to execute the process during which the masters coaching diminishes. From a teaching point of view, Collins et al., (1989) represent this threefold sequence as modelling, coaching, central to which is scaffolding and fading.

Conceptually, cognitive apprenticeship is an instructional design model which is based on current understandings of how individuals learn (Bransford, Brown & Coocking, 2000). The goal of cognitive apprenticeship is to address the problem of inert knowledge and to make the thinking processes of learning activity visible to both learners and experts. The expert is then able to employ the methods of traditional apprenticeship (modelling, coaching, scaffolding and fading) to effectively guide learners learning (Collins et al., 1991). So, cognitive apprenticeship applies to trade-oriented apprenticeship. One other goal of cognitive apprenticeship model of teaching and learning is to support novice learners in developing their reasoning abilities by making expert thinking in a subject visible (Collins, Brown, & Holum, 1991). Cognitive apprenticeship supports the effective integration of academic and vocational education so learners construct their own knowledge and internalize the thinking processes.

Collins et al. (1989) proposed six major characteristics, components or teaching strategies for the concept cognitive apprenticeship. in the development of strategic thinking to learn and apply complex concepts in the environment The strategies are modelling, coaching, scaffolding, reflection, articulation and exploration and executive functioning is a concept from the theory of Metacognition by Flavell (1979) which has a theoretical base and its relevant to this study. Firstly, modeling in cognitive apprenticeship means showing how a process unfolds and giving reasons why it happens that way.

Furthermore, the goal of this stage is to build mental models of expert's cognitive processes so that learners can eventually work on their own. (Brill, Kim & Galloway, 2001). Mental models are psychological representations of real, hypothetical or imaginary situations and consists of an explanation of someone's thought process about how something works in the real world and also an internal symbol or representation of external reality, hypothesized to play a major role in cognition, reasoning, decision making and problem solving (Sanders, 1896) By seeing both processes modeling and accompanying explanations, learners can develop the knowledge about when and where they should use the knowledge to solve a variety of problems (Seitz, 1999). Therefore, modelling does not just occur at the beginning of the study. As learners experiment and create, the expert might take a moment to model a more sophisticated technique (Darling-Hammond, Austin, Cheug, Lit & Martin, (2006).

Also, modelling proposed by Bandura (1977) is an instructional strategy in which an expert demonstrate a new concept or approach to learning and by which the apprentice learn by observing. Modelling requires that an expert demonstrate to novice how to closely approximate the real world setting. Experts can use a variety of method to model complex problem solving including talking aloud protocol requires experts to explain how they approach on certain characteristics of the problem. What is important is the cognitive process or strategy for problem solving is made visible.

The second component of cognitive is coaching; Coaching with cognitive apprenticeship consists of assistance delivered either prior to during or after portion of a learning performance (Darling-Hammond et al., 2006; Gibbons, 1996). The master coaches the apprentice through a wide range of activities, choosing tasks, providing hints, evaluating the activities of apprentices and diagnosing the kinds of problems they are having, challenging them and offering encouragement, giving feedback, structuring the

ways to do things, working on particular weaknesses Moreover, Scaffolding is the third component of cognitive apprenticeship; scaffolding is used when learners have not fully mastered the problem solving process in a discipline and expert provides support for the learners by cooperating with learner in solving a problem. For scaffolding to be effective, the experts must perform an accurate assessment of the apprentice current skill level of difficulty with the task at hand. Likewise fading consists of gradually attempt to solve complex problems or address complex situations. As the expert fades from the problem, situation, the apprentice is responsible for more and more accomplishment of the task. Scaffolding is used in cognitive apprenticeship to empower novices to perform independently (Ding, 2005). The use of guides and narratives are gradually removed as novices demonstrate the effective problem solving strategies they have incorporated through modelling and coaching. In the place of definite guides, subtle reminders, and hints to support the performance of new skills is given to the apprentice. The novice is asked to assume much of the task as possible but with the knowledge that cooperative problem solving remains available (Collins, Brown & Newman, 1989).

Moreover, scaffolding is based on Vygotsky's concept of the zone of proximal development (ZPD); which he defined as the distance between the "actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or collaboration with more capable peers (Wilson et al, 1993). Scaffolding can include tasks that allow learners to see what they are working toward a series of sequenced steps with product, or a variety of aids for learners including materials, techniques and tutoring on specific concepts or skills (Darling-Hammond et al, 2006; Gibbons, 1996). As novices become more skilled, scaffolding is removed (sometimes referred to as fading), giving the apprentice more and more responsibility (Darling-Hammond et al, 2006, Brill, Kim, & Gallowway 2001; Oliver, 1999).

Also, the fourth component of cognitive apprenticeship is reflection; Reflection requires learners to think deeply. Reflection is a cognitive process which when executed, enables the ideas, understandings and experiences of apprentice to be reviewed (Presbkill & Torres, 1999).

Reflection allows use of memory, understanding, imagination, and feelings to grasp the essential meaning and value of how one is proceeding. According to Mezirow (1990) reflection allows individuals to correct distortions in their beliefs and critique the presupposition on which their beliefs have built. Therefore, when reflection is applied in the learning environment, expert better understand the mental models of their apprentice (Mezirow, 1990). Walkins & Marsick (1999) maintained that, reflection is learning through which apprentice are enabled to correct flaws in thinking. With reflection, mentor can pose experimentally-based questions or ask apprentices to construct their own questions, throughout the learning experience, questions that consider content (Brill, Kim & Galloway, 2001).

In like manner, articulation is the fifth component of cognitive apprenticeship; Articulation refers to any method that requires learners to share their thinking in terms of how they approach a situation and what they take in to consideration. Articulation can take the form of assignment or inquiry, where experts ask apprentice questions aimed at making visible the learners metacognitive knowledge (Lave & Wenger, 1991). Lastly, exploration involves asking apprentice to imagine other ways in which they might enhance their approach to solving tasks on problem situation. Enkenberg (2001) sees exploration as a cognitive activity where apprentice generate hypotheses which are tested in order to construct new ideas and viewpoints. In addition, articulation consists of expressing things at a verbal level and plays a role in forming patterns of performance and knowledge. It is a part of learning to learn, and must be practiced as part of starting from the beginning of learning (Gibbons, 1996). Talking about one's plans and activities as they solve problem can help learners develop more appropriate mental models of expert's performance (Wilson, et al. 1993) Articulation is therefore interwoven with learning experience through a variety of strategies including, discussion, demonstration, presentation, learner-produced artifacts (Brill, Kim & Gallway, 2001).

Lastly, the sixth component of cognitive is exploration; Exploration occurs once learners is competent enough to solve problems and through reflection, becomes aware of how they think through the problem solving process. Likewise, exploration encourages apprentice to take problem solving to the next step, to begin to ask meaningful questions beyond those that have been addressed. Exploration in cognitive apprenticeship is pushing apprentice to try out their hypotheses, methods and strategies with processes similar to those that experts use to solve problems (Collins, 1991). Exploration consists of forcing the apprentice in to problem solving situations where the path to solution is not clearly labelled and where guidance is sparse (Gibbons, 1996). The apprentice need to continue to articulate and reflect on what they have found as experts do in real situation (Brill, et. al 2001).

Theoretically, the following theories were found relevant to the study: metacognitive by John Flavell, (1978) is found relevant in this study. Metacognition essentially means thinking about thinking Flavell (1978) where people have to think out of the box through higher order thinking processes like reflection, critical thinking in problem solving.

Likewise, Communities of Practice and situated learning theory by Lave and Wenger (1991) is also found relevant to this study. Lave and Wenger (1991) have defined the community of practice as group of people who come together to share common interest and goals within the aim of sharing information, developing knowledge and developing themselves both personally and professionally. Other definition of community of practice are; groups of people who share a concern, a set of problems or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on ongoing basis (Wenger et al., 2002). In the same way, situated learning theory by Jean Lave & Etienne Wenger (1990) theory is found relevant in this study. Situated learning essentially is a matter of creating meaning from real activities of daily living (Stein, 1998). Situated learning suggests that learning takes place through the relationships between people and connecting prior knowledge with authentic, informal, and often unintended contextual learning.

Also, Vygotsky' socio-cultural theory (1978) is relevant in this study where learning takes place at the zone of proximal development and where mediation by expert is very important in problem solving and finally, Transformative learning theory by Jack Mezirow (1978) that is based on the rationale of reflective and rational thinking as one gain experience in the process of learning, it seeks to inform the independent variable of this study productive learning. Emerging adulthood: A theory of development from the late teens through the twenties by Jeffrey Arnett (2000). All these theories supported both the independent and the dependent variable of the study.

Contextually, in the context of Cameroon, is mostly the case of apprenticeship. Apprenticeship combines enterprise-based training in productive skills with financing scheme to meet the financial constraint of young people, their families, and their community. At the core of apprenticeship in Cameroon, there is an agreement made between the expert and the apprentice, where by training is integrated in to the production and work process which enhances cost-effectiveness of apprenticeship skill development, which contributes to productivity and employeability of the novice. The apprentice at the beginning of the training pay a fee in order to be register as a member of the workshop and the duration of the training is being negotiated which sometimes last for three to four years, three years and sometimes more. The apprentice in the process acquire skills of cognitive apprenticeship where they work side-by-side with the expert to acquire tacit knowledge and vocational skills. Tacit knowledge is therefore acquired through discovery learning, imitation as the apprentice observe, practice gain skills and competencies through experience. The novice in the process of learning gain vocational skills and occupational skills where he or she uses the tools of the workshop to practice. During the training given in cognitive apprenticeship, the master is expected to provide some basic moral upbringing to the child too. Masters have these cognitive skills but might not have the strategies to transmit as the researcher thinks coaching, scaffolding and executive functioning could be some strategies to use when transmitting cognitive skills to the apprentice for productive learning to take place.

Context wise, like traditional apprenticeship in which the apprentice learns a trade such as Mechanic work, by working under a master, cognitive apprenticeship allows the master to model behaviour in a real world context with cognitive modelling (Bandura, 1997). African mechanic start training in boyhood and girlhood and apprenticeship happens in the course of daily life (Lave, 1991). From the master to the apprentice the traditional knowledge is the hinge to preserve cultural knowledge on mechanic. According to Erner (2004) they are a cultural expression based on the articulation of participative beliefs, personal narrative that reveals cultural identity (Craik, 1994).

Equally, auto mechanics involves application of specific knowledge in the design, selection of materials, construction, operation and maintenance of automobiles. Auto mechanics technology is one of the trades offered in technical colleges (Federal Republic of Nigeria, 2004). It is designed to produce competent craftsmen in auto mechanics trades. According to the National Board for Technical Education (NBTE, 2009) auto mechanics craftsmen are expected to test, diagnose service and completely repair any fault relating to the conventional automobile assembly main units and systems by following the manufacturers specifications. Too little attention is paid to the reasoning and strategies that experts employ when teaching the learners how to solve complex or real life tasks (Collins et al. 1991).

The problematique between cognitive apprenticeship and productive learning skills in Buea Municipality especially in mechanic work can be traced from the end product, that is productive learning skills the end product is problematique, where cognitive skills are needed for the development of productive learning skills. The kind of apprenticeship mostly practice is traditional apprenticeship which focuses on transmission of traditional knowledge from the expert to the novice with little or no cognitive skills transmission that enable the apprentices to be less productive. Therefore, the application of cognitive skills has a great role to play for productive learning. What puzzles the researcher to carry out this study is the gap that arise from cognitive apprenticeship and the development of productive learning skills among novices. The development of productive learning skills therefore is a problem to this study. The acquisition of cognitive skills and deep learning at the zone of proximal development is problematique. The researcher saw students from a non-formal sector OIC engaged in some mechanic garages doing their practical which the researcher deemed as problematique while they won't remain at OIC to carry out their practical and why they had to come to the informal garages for internship.

Objective of the study

Main variables: Cognitive apprenticeship and Productive Learning Skills

General objective

- To determine the extent to which cognitive apprenticeship impact productive learning skills among emerging adults engaged in mechanic work in the informal sector in Buea Municipality

Specific objectives of the study

Specifically, this study is intended:

- To find out the extent to which scaffolding impact productive learning skills among emerging adults engaged in mechanic work in the informal sector in Buea Municipality

LITERATURE REVIEW

Discussion of concepts

The concept of cognitive apprenticeship

Collins et al., (1989) define cognitive apprenticeship as learning through guided experience on cognitive and metacognitive skills rather than physical skills and processes. One cannot engage on cognitive apprenticeship alone, but rather it is dependent on expert demonstration (modelling) and guidance (coaching) in the initial phases of learning. Learners are challenged with tasks slightly more difficult than they can accomplish on their own and must rely on assistance from and collaboration with others and with time move from a position of observation to one of active practice (Collins et al., 1989). For the following methods support the goals of cognitive apprenticeship or features proposed in the context of cognitive apprenticeship. That is modelling, coaching, scaffolding and fading, articulation, reflection and exploration. Modelling in cognitive apprenticeship means showing how a process

unfolds and given reasons why it happens that way. The goal of this stage is to build mental models of experts, cognitive processes so that learners can eventually work on their own (Krill, Kim, & Galloway, 20001). Moreover, by seeing both processes, learner can develop the knowledge about what and when they should use the knowledge to solve a variety of problems (Seitz, 1999; Wilson, Jonassen & Cole, 1993; Wilson & Cole, 1991). Modelling just not occur at the beginning of the study. As the learner experiment and create, the teacher might take a moment to model a more sophisticated technique (Darling-Hammon, Austin, Cheung, Lit & Martin, 2006).

Wikepedia encyclopedia (2007) asserts that, cognitive apprenticeship is a theory of the process where masters with specific skill teaches that skill to a learner or apprentice. This involves the use of modelling, coaching, reflection on performance, and articulation methods of traditional apprenticeship, but with emphasis on cognitive rather than physical skills (Collins, 1988). The term cognitive was coined by Collins, Brown & Newman (1986) who proposed that contemporary classroom instructional methods landmark study, the age-old apprenticeship learning that combined with the age modern pedagogical practice of real world experiences. Other researchers have identified cognitive apprenticeship instructions as a viable means of modernizing technical education (Rai, 1989; Wilson & Cole 1991; Brandt, Famer & Buckmaster, 199I). Furthermore, cognitive apprenticeship includes four essential features that is; content, methods, sequencing and sociology (Collins, Brown & Newman, 1986).

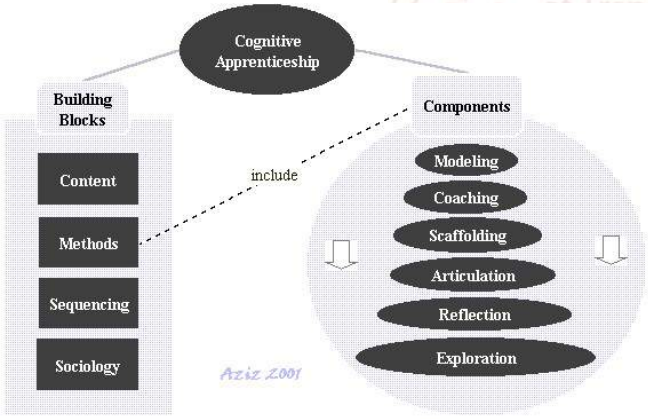

Figure1: Overview of Cognitive Apprenticeship blocks and Components (Collins, Brown & Newman, 1989-1991).

The diagram above explains (Collins et al., 1989, 1999) overview of cognitive apprenticeship blocks and components which stipulates that cognitive apprenticeship is characterized on four building blocks that are content, methods, sequencing, and sociology. Content deals with facts, domain knowledge, procedures and general applicable techniques for accomplishing a task and learning strategies. The methods or components of cognitive apprenticeship consist of modelling, coaching, scaffolding, articulation, reflection and exploration. Sequencing deals with the ways learning activities are being ordered and sociology deals here with learning social context where learners perform tasks which is also known as the authentic context for task accomplishment.

Thus, what makes cognitive apprenticeship different from other concepts in this study is that, it involves metacognitive skills and also involves the development and internalization of a producer-critique dialogue that learners can gradually internalize. The development of externalization is accomplished through discussion, alternation of the expert roles and through group problem solving.

The concept of scaffolding

Moreover, scaffolding refers to a form of temporary support offered to learning to assist in the process of becoming a skilled practitioner. The most form of learning has been through apprenticeship where a novice learns through active participation and then assuming more control and ownership. Scaffolding originates in the socio-cultural perspective of Vygotskian theory. Scaffolding describes certain kinds of support which learners receive in their interaction with experts and mentors as they develop new skills, concepts or levels of understanding. Brunner, Wood & Ross (1976) describe the effective intervention by peer or peer-adult or competent person in the learning of another person. Bruner explicitly relates the term scaffolding to Vygotsky's concept of the zone of proximal development that is the actual development level the learner where he or she can independently accomplish a task and the potential development that can occur with guidance or collaboration with a more competent person. Scaffolded instruction is conceived as a joint interaction in which the expert and the novice share responsibility for learning (Vygotsky, 1978; Wood, Bruner & Ross, 1976). Scaffolding therefore involves mediation where learners attain new skills, concepts and knowledge.

Moreover, the socio-cultural approach emanating from the work of Vygotsky has a major influence on the development of scaffolding instruction and apprenticeship models of learning (Vygotsky 1978, Wood & Wood, 1976; Rogoff & Lave 1984; Collins, Brown & Newman, 1989). Scaffolding emphasized the role of social interaction as a cultural amplifier to extend learners cognitive problems with experts introducing learners to the conceptual tools available in society. Therefore, for cognition to be analyzed, culture and context and the fundamental units of consideration, as human development is seen to be located and immersed in social practices. Hence, meaningful activities are embedded in authentic socially-centered situations. This perspective has profound and far reaching influences on how practitioners design learning environment. Cognitive change can be affected through social processes of social interaction in which ideas are articulated, shared, revised, modified and adopted because of their relevance to the cultural context (Roschelle, Levine & Teasley, 1991; Newman, Griffin & Cole, 1989). Learners progress through the zone of proximal development by attempting approximations of the learning task, assisted by peers and more abled others and with an expert.

Notwithstanding, support in the form of dialogue, discussion, demonstration is found effective in enabling cognitive change (Lave, 1991; Palincsar, 1986). The expert is conceived as providing scaffolding assistance through modelling, contingency, management, cognitive structuring and feedback (Tharp & Gathimore, 1988). Through modelling, tasks, skills and concepts can be demonstrated while retaining complexity and authenticity so that learners

can become engaged in the acquisition of new skills. Contingency is concerned with the recognizing and rewarding learners actions while feedback enables learners to compare themselves to others. With cognitive structuring, learners are assisted to organize their own experiences following the provision of explanations or meta-level strategies to enable learners to organize their own thinking and later on these mechanisms are internalized and become metacognitive strategies for learners to regulate their own learning.

Furthermore, verbal scaffolding such as questioning, instructing and cognitive structuring, that is, (Cognitive structures here refers to the patterns use by people to process information which involves symbolic representation of the mental process to encode, store and retrieve information) that enable learners to organize their own thought activities by suggesting meta strategies that learners acquire so that expert support begins (Tharp & Gallimore, 1988). Therefore, instruction is anchored in daily authentic context and verbal interaction is a common form of scaffolding where learners and experts engaged in social context, with prescribes rules, roles and expectations. Larger groups are broken in to smaller ones and supports are provided so that the tasks are given to the apprenticing learner within the reach of the learner's current ability level or zone of proximal development (Vygotsky, 1978). Hence, critical to apprenticeship is that the task must be representative of authentic skills. Scaffolding therefore is intended to be a tool to help learners do something that could not be done without assistance (Pea, 2004). According to Rasku-Puttonen et al., (2003) learners need extensive support when working on long-term problem-based learning activities as well as ample opportunities for reflection. Scaffolding therefore help learners to become self-regulated learners (Tuner, 2002). In fact, learners need scaffolding in order to structure tasks as to fit it in to the learners' zone of proximal development (Sugar & Bonk, 1998).

Scaffolding is useful for articulation and reflective processes. Reflection promotes knowledge integration and learners turn to share their thoughts in activities. Scaffolding therefore address the needs of learners but bring about the learners together as a community with a common goal all working within the zone of proximal development (Groos et al., 2002). In fact, collaborative learning therefore leads to inquiry learning. Scaffolding therefore serves two purposes; it can be used to help provide structure to the learning tasks, guiding them through the major stages or tasks and prompting learners at appropriate times and secondly, it can be used to create a problem space in which learners must explore the contents. Scaffolding therefore provides a collaborative learning space, where the expert acts as a facilitator and the novice is tasked with communicating and creating knowledge objects which therefore engage learners in authentic tasks and scaffolding is provided in the form of task assistance and hints as needed (Schank et al., 1999).

Furthermore, the scaffolding enable learners to develop self-monitoring and corrections skills and in integrating the skills and conceptual knowledge needed to advance towards expertise. Observation plays a very important role. Lave hypothesizes that scaffolding aid learners in developing a conceptual model of target task or process prior to attempt to execute. Scaffolding provides learners and advance organizer for their initial attempts to execute a complex skill, that allows learners concentrate more of their attention on execution. Secondly, a conceptual model of scaffolding provides an interpretive structure for making sense of the feedback, hints and corrections from the master during interactive coaching. And finally, scaffolding provides an internalized guide for the period of relatively independent practice by successive approximation. It provides or encourages autonomy in what is called reflection (Collins & Brown, 1988). Reflection therefore is the process that underlies the ability of learners to compare their own performance, at the micro and macro levels to the performance of the expert. In cognitive apprenticeship, learners learn how to apply their skills in varied contexts that is the abstract principles underlying the application of knowledge and skills in different settings. Scaffolding is diagnoses of the learners content skills level or difficulty and availability in carrying out the target activity. With scaffolding, fading consist of the gradual removal of support until the novices are on their own.

Vygotsky (1987) distinguishes between the actual development of the novice and the potential development of the novice. The actual development is determined by what a novice can do unaided by an expert or peer while the potential development refers to what a novice can do through problem solving under expert guidance or in collaboration with capable peers (Vygotsky, 1978). The zone of proximal development is the gap or area between the actual and the potential development, that is what a novice can do unaided by a more knowledgeable person and what he or she can do under the guidance of a more knowledgeable person. Therefore, it is within this area that cognitive apprenticeship takes place (Collins, Brown & Holumm 1991).

The concept of productive learning skills

Productive learning skills goes with making object for everyday use with "head and hand and heart that entails receptive skills". Productive learning skills leads to the development of skills, competency, knowledge, abilities, aptitudes and intelligence through experiences as learners engage in authentic and real-life tasks. Competencies are closely related to the learners' attributes and refer to specific patterns of behaviour that enable someone to perform a task at the required standard. Competencies can be define as a combination of knowledge, skills and attitudes which facilitates the application of knowledge to the real world context (Cook & Weaving, 2013). Accordingly, competency involves the ability to meet complex demands by drawing on and mobilizing psychological resources (skills and attitudes) in a particular context. Productive learning therefore will occur when learners are competent, skillful, knowledgeable, reflective, creative, where problem solving occurs in contexts that required specific knowledge, skills and understanding. In fact, a lot of intra-interpersonal skills are required to demonstrate them. Productive learning occurs when learners think hard (Husband, 2014). This entails that learners mobilize a number of different mental processes and resources that are both cognitive and socio emotional. Heckman, Diris, Ter, Well & Borgans (2014) describe a number of non-cognitive skills, these include personality qualities such as perseverance, self-control, attentiveness, resilience to adversity, openness to experience, empathy and

tolerance of diverse opinion as they regard as skills for productive learning.

Furthermore, with productive learning, learners construct their own understanding from their experiences. Understanding cannot therefore be transmitted from a person (or any resource) without active engagement of the learner. The most important implication is that learning need to be engaging in order to challenge the learners to think hard. Hence, every learner brings knowledge, understanding and learning habit to the learning process. The zone of proximal development by Vygotsky (1978) is helpful in identifying the distance between what the learners can achieve working on their own and the level of their potential development when being guided by the skilled expert. Vygotsky (1978) asserts that learning is optimized when learners thinking is extended beyond that they can easily manage on their own. This make the learners think hard and challenge their existing understanding. Hence, instructors are responsible for designing and delivering instruction and learning tasks that foster deep learning in the zone of proximal development. To attain this, Hattie (2009) asserts that instructors need to be activators not facilitators of learning and instructions take learners at the next level, where learners thinking can constantly be challenged. Therefore, learners' opinions and ideas are absolutely relevant to developing the learners' attributes where they can think hard about what it means to be confident, responsible, reflective, innovative and engage in all the contexts of their learning in the workplace.

Accordingly, the best moment is when the mind is stretched to its limits in a voluntary effort to accomplish difficult and worthwhile tasks. Productive learning lies in intelligence, focusing on problem solving, involving an analytical problem solving tasks. According to Stenberg (2009) intelligence can be seen as a person's ability to adapt to an environment and quickly learn from experiences, demonstrating effective problem solving strategies in a variety of context. It can be seen in the following indicators, practical problem solving abilities as well as analytical skills. Sternberg (2009) sees intelligence as the ability to achieve a goal in life. He pointed out that a successful learner in life and in the workplace have original creative ideas and the reflective, practical skills and management skills are necessary to make the best of their abilities. Practical intelligence involves the ability to get things done, to communicate well, collaborate and see a task a through completion. Stenberg argues that intelligence, creativity, and wisdom are learnable and can be developed over time. Therefore, learners construct their own understanding of the world bringing prior knowledge and learning habits to the learning process where one turn to internalize experiences, hence emotions and decision making becomes imperative in productive learning skills.

In productive learning, competent performance require inquiry based learning where skills are best developed in authentic learning activities that are much as like the desired end products as possible (Christodoulou, 2016). Critical thinking, creativity, communication and collaboration depend on complex reasoning (Abadzi, 2015). The working memory becomes important in productive learning as a processing power in learning and performance as learners practice a task, it becomes embedded in their long-term memory. Productive learning takes place through experiential learning as learners engage through direct challenges that is being supported by reflecting, developing skills, acquire knowledge and positive attitudes.

Cognitive development in emerging adulthood

Emerging adulthood is marked by a prolonged developmental transition to adulthood, dynamic personal and environmental circumstances and a unique pattern of vulnerability to psychological dysfunction. Cognitive development in emerging adulthood is at the post-formal stage as they think flexible, logically, and make choices. It involves more practical, flexible and dialectical thinking characterized by ideas. Adults thinking here is more structured where people consider multiple logics, choices or perception in order to better understand the complexities and inherent biases in truth (Griffin et al, 2009). Cognitive development in emerging adulthood involve the manner in which adults structure their adult lives and as their cognition develops, their thinking and understanding of the world become more abstract and complex and the ability of holistic thinking develops by looking at the whole rather than the parts. Cognitive development in emerging adults can be perceive through dialectal thinking where they view issues from multiple perspectives. Nevertheless, thinking in emerging adulthood is holistic, where holistic thinking involves the inquiry of a complex of whole.

In the emerging adult, the brain is the neural system that support identity and role exploration as the individual navigates new feelings of instability and freedom in life grapple with feelings in-between adolescence and adulthood and the transition from the perception of future life possibilities to managing their emergence (Arnett, 1998). Emerging adulthood is a period marked by greater social freedom and delays in marriage, and greater gender equality (Arnette, 1998). Emerging adulthood is a developmental window or trajectory between adolescents and adulthood (Arnett, 1998). Emerging adults have specific subjective characteristics and the three main aspects considered by them as important criteria to achieve adulthood are, assumptions of responsibility for oneself, making independent decisions and financial independence. The first two criteria were classified as individual qualities, due to focusing on the importance of becoming a self-sufficient person; financial independence is crucial to attain self-sufficiency and its more associated with achieving a function associated with adulthood such as having children and leaving the parental home rather than character quality (Arnett, 2011). Emerging adults spent their time on self-focus exploration, trying out different possibilities for love and work, experimenting with various identities, lifestyles, career paths. Arnett called the age 30 "deadline". It is an age cohort whereby an entire generation of young people struggle financially.

concept of Emerging adulthood

Emerging adulthood is a proposed as a new conception of development for the period from the late teens through the twenties, with a focus on ages 18 to 25 (Arnett, 1998). Emerging adulthood is meant to describe a new stage for the period between adolescence and adulthood. Importantly, it is not considered a universal life stag, but rather one that have emerged in certain industrialized societies due to social and economic changes that have led to delays in marriage, parenthood, and assumption of other adult roles (Arnett, 2001, 2011). Emerging adulthood has five defining features according to Arnett (2004); identity exploration, in which

young people are searching to find meaning in work, relationships and ideologies, age of instability; which refers to individual tendencies to change residence, job, relationships more frequently than at other times of life; age of possibilities; captures the optimistic spirit of emerging adults referring to many options that emerging adults see before them, self-focus; refers to emerging adults relative freedom from obligation to parents, spouses, and children, allowing them to pay greater attention to their own lives, and age of feeling in between; is indicative of the subjective experience of emerging adults, who acknowledge feeling not quite like adolescents anymore, but not fully adults yet. Arnett, 2004 sees emerging adulthood as a time a time of exploration and opportunity. The cognitive characteristics of emerging adults in the context of this study is their thought is postformal, more practical, flexible and dialectical characterized by problem solving, as they look at the cons and pros in problem solving. They have a sense of broad possibilities for the future by reasoning dialectically.

According to Lo-oh (2009) the implication in the lifecourse is evidenced in how young people conceive and define adult status today. According to him, in the African sub region in general and Cameroon in particular, the transition to adulthood is an arduous task characterized by several challenges (Lo-oh, 2009). Notwithstanding, social and economic inequalities in the African continent continue to mark the challenges of Africa's youth life courses. Youths in urban areas are beginning to experience problems with over nutrition, some rural youths still face nutritional deprivation (Nsamenang, 2007). (Lo-oh, 2009) asserted that unemployment and crime rates are dramatically higher among rural youth and young adult counterparts, thus enjoy significant advantages in a labour market that increasingly reward credentials and not basic skills.

The concept of mechanic work

Mechanic work is a trade craftsmanship. Mechanic work involves application of specific knowledge in the design, selection, construction, operation and maintenance of automobiles. Mechanic work is a trade. Mechanic work is geared to test, diagnose, service and completely maintain fault relating to the conventional automobile assembly like vehicles of different brands. Mechanic work enable workplace skills and create higher order thinking skills which are needed in order to increase the learners' flexibility and job mobility which makes them adaptable to the present and envisaged changes (Hallak & Poison, 2000).

Furthermore, as concern learning, with mechanic work for instance, Bruner (1966) states some important structures that informs, learning, teaching and practice. This has to do with this learning task, mechanic work in the context of this study; where good methods for structuring knowledge should be as such, simplifying, generating new propositions and increasing the manipulation of information. In his learning principles in learning, teaching and practice, instruction must be concerned with the experiences and context that make learners willing and able to learn, instructions must be structured in a way that enable learners to easily grasp, and instructions should be designed for learners to fill in the gaps, going beyond the information given. Therefore, information should be represented in enactive, which is representation of knowledge through actions, iconic which is the visual summarization of images and symbolic representation which is the use of words and other symbols to describe experience. Therefore, learning should be done to foster the development of problem solving skills via inquiry and discovery and the structure of teaching should be designed for learners to gain more powerful mastery skills.

Theoretical Concerns

Communities of Practice and Situated Learning Theory by Jean Lave & Etienne Wenger (1990).

Lave and Wenger (1991) have defined the community of practice as group of people who come together to share common interest and goals within the aim of sharing information, developing knowledge and developing themselves both personally and professionally. Other definition of community of practice are; groups of people who share a concern, a set of problems or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on ongoing basis (Wenger et al., 2002). A group of people informally bound together by shared expertise and passion for a joint enterprise (Wenger and Snyder, 2000). Furthermore, people join communities for several reasons such as education, professional issues and hobbies. A community of practice is group of people who share a craft or a profession. The concept was first proposed by cognitive anthropologist (Lave & Wenger, 1991). It is created with the goal of gaining knowledge related to specific field. It is through the process of sharing information and experiences with the group that members learn from each other and have an opportunity to develop personally and professionally (Lave & Wenger, 1991). Community of practice therefore exist in physical setting where people share their experiences. It is therefore learning through practice and participation which they named situated learning.

Moreover, the structure of the community was created over time through a process of legitimate peripheral participation learners form an identity in the social world. Lave & Wenger (1991) looked at how apprenticeship help people learn, they found that when newcomers, join an established group or community, they spend time initially observing and perhaps performing simple tasks in basic roles as they learn how the group works and how they participate. Lave & Wenger (1991) described this socialization process as legitimate peripheral participation where group share common interest and a desire to learn from and contribute to the community with their variety of experiences. Lave (1998) describe the structure of community of practice as consisting of three interrelated terms; mutual engagement, joint enterprise and shared repertoire. Firstly, mutual engagement involves participation in the community, members establish norms and build collaborative relationships. Joint enterprise; through their interactions, they create a shared understanding of what binds them together. Therefore, the joint enterprise is negotiated and renegotiated. In shared repertoire, the community of practice produces a set of communal resources, which is termed in the pursuit of their joint enterprise and can include both literal and symbolic meanings. Community of practice therefore aim to engage in shared knowledge that lead to higher productivity (Wenger, 2004).

Indeed, people join a community to develop knowledge and specific expertise about a particular issue which could not be obtained otherwise. (Wenger & Sbyder; 2000; Wenger et al.

2002; Metallo 2007). According to Lave & Wenger (1991) a community of practice is defined as group of people who come together to share common interests and goals aimed at improving their skills by working alongside more experienced members and being involved in increasingly complicated task. The community is a locus that enable a newcomer to learn by engaging in simple tasks, assisted by comparatively or highly experienced people. Initially, newcomers become acquainted with the tasks, norms, values and principles of the community etc. According to Lave & Wenger (1990, 1991) learning occurs in social relationships with others, learners by observation and peripheral participation in the community rather than in a classroom setting. A person's intentions to learn are engaged and the meaning of learning is configured through the process of becoming full participant in a sociocultural practice. This social process includes the learning of knowledgeable skills (Lave, Wenger 1991). The community is the social structure that encourage learning through interaction and relationships among members. Community is a crucial element effective knowledge structure (Wenger et al., 2002).

Firstly, situated learning essentially is a matter of creating meaning from real activities of daily living (Stein, 1998). Situated learning suggests that learning takes place through the relationships between people and connecting prior knowledge with authentic, informal, and often unintended contextual learning. In this situation, a learners' role changes from being beginner to an expert as they become more active and immersed in the social community where learning often unintentional rather than deliberate (Oregon Technology in Education Council, 2007). Therefore, the social community matures and learns through collaboration and sharing of purposeful, patterned activity (Oregon Technology in Education Council, 2007). As the practice implies the learner is situated in the learning experiences and knowledge acquisition becomes a part of the learning activity, its context and the culture in which it is developed and used (Oregon Technology in Education Council, 2007). This theory is relevant in this study in that, through mutual engagement, people share ideas, gain experiences and accomplish tasks.

Vygotsky socio-cultural theory (1896-1934)

Vygotsky (1978) believed that two levels of mental function exists. The elementary and higher mental functions. The first are functions that individuals are born with (that is, no learning required for their use), these functions require no thought and are natural occurring. Conversely, higher mental functions include the creation and use of self-generated stimulation such as memory, attention, thinking and language. The transition from elementary to higher mental functions is made through the use of tools and symbols. Culture then dictates what is valuable to learn and how it is learn. Society then is the driven force behind cognitive development. Cognitive development proceeds in order to prepare a person to interact with society in a meaningful way. Therefore, cognitive development is the internalization of social functions and the conversion of social functions in to mental functions.

Vygotsky believed that individual development could not be understood without reference to the social and cultural context within which such development is embedded. He states that using activity mediators, the human being is able to modify the environment and this is her way of interacting with nature. Hence, Zone of Proximal Development is actually the gap between actual competence level (what problem level a learner is able to independently solve), and the potential development level (what problem level could she solve with guidance from a tutor). It supports a representation of intellectual development based on continuity. It states that learning can force cognitive development. It states the role of the expert as a necessary mediator of novices' cognitive development. Therefore, the Zone of Proximal Development is based the mental functions that have not yet matured but are being in the process of maturation. It supports a representation of intellectual development based on continuity. It states that learning can force cognitive development, and with scaffolding, cognitive development in the zones of proximal development stresses the role of a social partner of the novice (An expert or a more skilled peer). Also, with scaffolding, the instructor becomes a supportive tool for the student in the zone of proximal development. The characteristics of an ideal teacher are those in which scaffolding provides support, it functions as a tool, it allows to accomplish a task otherwise impossible. In Vygotsky's view, learning is an interactive interpersonal activity. The psychological mechanism is to create (external) activities that will be later internalized by novice.

This theory is relevant in this study in that, learning occurs at the zone of proximal development where scaffolding in the form of assistance becomes very important where mediation is provided from expert to novice or from more knowledgeable persons to build the skills of the novices to gain knowledge and later on accomplish tasks.

Metacognitive theory by John Flavell (1978)

Flavell (1978) referred to metacognition a knowledge that takes as it objects or regulates any aspects of any cognitive endeavours. Metacognition is defined in simplest terms as thinking about your own thinking. The root "meta" means "beyond", so the term refers to "beyond thinking". Specifically, this means it encompasses the processes of planning, tracking and assessing your own understanding or performance. Flavell identified what he believed to be two elements of metacognition and regulation of cognition (Flavell, 1985). He brought forth different types of metacognition knowledge. Firstly, declarative knowledge "personal knowledge or understanding one's own capabilities and procedural knowledge, task knowledge including content (what one need to know) on the other hand task knowledge is related to how difficult and individual perceives the task to be as to their self-confidence; while strategy knowledge is one's ability to use strategies to the new situation. This is related to the age or developmental age of the individual. Metacognition regulation is used to describe how individuals monitor and assess their knowledge. This includes knowing how and when to use certain skills, and help individuals to control their learning. For example, learners reflecting their learning on the tasks assigned to do efficiently. Metacognition experiences becomes very important in thinking about thinking. Metacognitive experiences are the experiences an individual has through knowledge. In metacognition, metamemory becomes relevant which is knowledge of what memory is, how it works and how to remember things. These skills develop over time and improves richly with instruction. The key factor in metacognition is motivation. Motivation is

essential in essential for metacognition. Learners therefore can struggle through self-reflection, and self-evaluation skills are essential in order to accomplish a task (Flavell, 1985).

Flavell (1979) proposed a model of metacognition that involves four interactive sub parts that is metacognitive knowledge, metacognitive experiences, goals and strategies. He defined metacognitive knowledge as that segment of one's stored knowledge that has to do with people as cognitive creatures and with their diverse cognitive tasks, goals, actions and experiences. To him, this type of knowledge is the part of knowledge which deals with individuals as cognitive beings and considers them different cognitive tasks, aims, behaviours and experiences as well. Metacognitive knowledge about humans include learners' general knowledge about humans as thinking organism. People's knowledge comprised judgments about their learning abilities and knowledge about internal and external factors that influence the success and failures in one's learning process (Vandergriff et al., 2006). Furthermore, task knowledge refers to learners' knowledge about the purpose, nature and demands of learning difficulties between two specified tasks. Knowledge about cognition refers to what individuals know about their own cognitive processes which facilitates the reflective aspects of metacognition (Brown, 1987). Knowledge about cognition is characterized in to declarative knowledge, procedural knowledge and conditional knowledge (Jacob & Paris, 1987). Declarative knowledge includes knowledge about oneself as a learner and about the factors that influence one's performance. Knowledge about self-strategies are other constitute of declarative knowledge (Schraw & Moshman, 1995). For instance, the knowledge about goals setting before setting a task. Procedural knowledge denotes knowledge about the execution of procedural skills and how to use strategies. Hence, individuals with a higher degree of procedural knowledge use skills more automatically are expected to structure strategies effectively, and use qualitatively different strategies to resolve problems and difficulties (Schraw & Moshman, 1995). Furthermore, conditional knowledge refers to knowing when and why to apply various cognitive actions. For example, before doing a task, one might know that goal setting could be much more appropriate. This theory is therefore relevant to this study in that it enables learners to think out of the box when solving problems where they think and reflect critically.

Transformative Learning theory by Jack Mezirow (1978)

Transformative learning reflects a particular vision of adult learning and a conceptual framework for understanding how adults learn. The meaning of what one learns rest with the accuracy with which one internalizes and represents accuracy and the knowledge within one's own cognitive schemes. Paula Freire (1979) articulated transformative learning to refer to as a consciousness raising. Critical consciousness refers to a process in which learners develop the ability to analyze, pose questions and take action on the social, political, cultural and economic context that influence and shape their lives Paula Freire (1979). Transformative learning is emancipatory liberating at both a personal and social level, by constructing for ourselves the meaning of the world.

According to Mezirow (1991) transformative learning is the process of making meaning from our experiences through reflection, critical reflection and critical self-reflection. Meaning according to Mezirow means making sense of the day to dayness of our experiences. He eventually named this process perspective transformation to reflect change within the core and central meaning structures. Perspectives are made up of sets of beliefs, values and assumptions that we have acquired through our life experiences. These perspectives serve a lens through which we come to perceive and understand ourselves and the world we inhabit. While these perspectives organize and make sense of a great deal of information within our internal and external environment. Through critical reflection, however we come to identify, assess, and possibly reformulate assumptions on which our perspectives are constructed (Mezirow, 1991). Like Freire, Mezirow views knowledge as something that is constructed by the individual in relation with others. Although imagination and creativity play a key role in transformative learning (Mezirow, 1995). The core of learning process itself is mediated largely through a process of reflecting rationally and critically on one's assumptions and beliefs. For Merizow, the outcome of transformative learning reflects individuals who are more inclusive in their perception of the world, able to differentiate increasingly its various aspects, open to other view points and able to integrate their experiences in to meaningful and holistic relationships (Mezirow, 1991).

In this sense, Mezirow consider transformative learning to represent the core of adult development like Mezirow and Friere, Daloz, (1996) theory of transformative learning relies on constructivist view of knowledge and learning. Daloz explanation of transformative learning depends less on rational, reflective acts and more on holistic and even intuitive process. Transformative learning according to Daloz, seems even more oriented to personal change. Transformative learning aims to bring about meaning in day to day live learning. It therefore involves learning how to negotiate and act upon one's own purposes, values, feelings and meanings and bringing about a change in the way people interpret the world. Transformative learning anchors on reflection on experience where learning is a process of making meaning from one's past experiences through reflection, and rational thinking. Knowledge and meaning is view as something that is constructed by the individual and in relations with others. Imagination and creativity becomes very relevant in transformative learning in that knowledge in the process of knowledge construction (Mezirow, 1995). Therefore, transformative learning depends on rational and reflective act for personal change.

This theory is relevant in the study in that it enables people to critically reflect in the process of learning that enable learners to become creative, hence this theory supports the concept of productive learning where learners gain skills and competencies as they engage in solving real life problems.

Emerging Adulthood: A theory of development from the late teens through the twenties by Jeffrey Arnett (2002)

Emerging adulthood is a period that is culturally constructed. Jeffrey Arnett define the age range between 18-25 as a culturally constructed period of the lifecourse bridging adolescence and young adulthood. The theory of emerging adulthood was proposed as a frame work for recognizing that the transition to adulthood was not a separate period of the lifecourse. Arnett proposed five features in the theory of emerging adulthood. That is, the age

of identity exploration, the age of instability, the self-focused age, the age of feeling-in-between and the age of possibilities (Arnett, 2004). The key feature of emerging adulthood lies in the age of identity exploration. It offers the most opportunity for identity exploration in the area of love, work and worldviews. In fact, during this period, emerging adulthood work experience become more focused on preparation for adult work roles where emerging adults start considering how their work experiences will lay the ground work for the jobs they may have in adulthood. Therefore, in exploring their work possibilities, emerging adults explore identity issues as well. What kind of work am I good at? What kind of work will I find satisfying in the long-term? What is the chances of getting a job in the field that seems to suit me best? In fact, exploration for emerging adulthood are for their own sake for obtaining a broad range of life experiences before taking an enduring and limiting adult responsibilities.

Furthermore, as concerns love and relationships, parental surveillance has diminished and there is yet little normative pressure to enter marriage. It is a period of trying out unusual work. Emerging adults may travel to different part of the country or the world on their own for a limited term of work. This time of exploration is part of expanding to their range of personal experiences prior to making the more enduring choices of adulthood. In developing countries emerging adulthood is often experienced in urban areas but rarely, young people in rural areas sometimes receive minimal schooling, marry early and have little choice of occupation except agriculture. With the feature age of possibilities; emerging adult live life with a lot of optimism where they move towards this in confidence that will somehow adhere to their goals.

Another feature of emerging adulthood is a time of feeling-in-between where emerging adults feel they have grown beyond adolescence, without thoroughly reached adulthood. They define the period as period where they can take full responsibilities for their action, and also having financial autonomy which sometimes they do not meet before they reach the age 20. Also, the age instability, which indicates unstable context in which emerging adults often find themselves. That is changes they experienced in work, education and romance can make the period very exciting. At times, high period of instability can make their transition to adulthood more challenging. Lastly, the age of self-focus, which explain the fact that typical orientation towards the self during this period should be taken cognizance of. Emerging adults turn to make their own decisions without asking the consent of a third party.

Notwithstanding, emerging adulthood is a transition period to early adulthood and this theory addresses the concept of emerging adulthood used as the subjects of this study. Their cognitive, socio-emotional, and physical development therefore affect their developmental milestone, pathways and trajectories and the researcher saw this developmental stage with its characteristics and features by Arnett relevant to this study.

Empirical concern (Empirical concern was by objective)

The effect of incorporating instructional methods (Scaffolding) on writing skills by (Cook & Campell, 1997)

Duccan (1996) examined the effects of incorporating the instructional methods of cognitive apprenticeship, specifically in scaffolding in Community College Writing Classroom. A non-equivalent control group design (Cook & Campell, 1997) was used in this study. Volunteer instructors and 159 students took part in writing the courses at Danville Area Community College Illinios. Writing skills test was used as the quantitative pretest and posttest was used and only students with complete set of data was included in the statistical analysis. Only 159 students completed the College Assessment of Academic Proficiency, and essay pretest, and the 91 students who remained in the nine classes who had taken the pre-test were administered the post-test. The instructors taught using the treatment group (Modelling, scaffolding and control groups). Proper training of instructors in the modelling with scaffolds treatment section was believed critical (Fischbach ,1993; Johnson, 1992). Modelling instructors participated in six hours of modelling combined scores and such scores for sentence structure) and rhetorical skills graded and entered to data for statistical analysis. Also, a second pretest an essay also administered during the first week of school and for the pre-test equal members of the two essay prompts were randomly distributed to students in each class by their instructors. All pre-test was given during the pre-test and post-test and the first week of classes post-test was administered during the final examination week of 15 semesters. The post test was written by all students both groups were evaluated by the same way of experience during the single grading session. White (1992) grading criteria which parallel the numerical holistic essay evaluation. The following univariate analysis of covariance indicated significant differences in the College Assessment of Academic Proficiency combined scores mechanic post-test score and Rhetoric post-test mean scores. No significance was found among the treatment group for the dependent variable essay post-test mean score. The analysis of covariance revealed that statistically significance differences in the mean post scores and did not exist among treatment groups. Three one-way analysis variance (ANOVA) were conducted to determine where significance between the groups occur. Instructors who performed the modelling and scaffolding reported that more training and supervision during the semester would increase both their competency and comfort in modelling and scaffolding. Conclusively, the aspect of this study that inform the work is the fact that tacit task is been brought open between the novices and the expert in the process of task accomplishment. Some of this empirical methodology were almost similar with that in this study like the pre and posttest.

METHODOLOGY

Research design

A quasi experimental design was chosen in this study because, there was an experimental group or treatment group and also the control group. The quasi experimental design aims to identify a comparison group that is as similar as possible to the treatment group. A quasi experimental research design was chosen for this study in that, it tests causal effect (XY) and test causal hypothesis. Y and X must precede and Y and X must be related to each other. The intervention or treatment denoted by an X given to one group, and the experimental group and non-intervention given to the other group, the control group. In the post test,

the measurement occurs after the intervention. The pretest allows the researcher to test for equality of groups on the variable of interest prior to the intervention. At the end, the mean scores were compared, that is, that of the experimental group in the pretesting and control group and that of the posttest in the mean scores were compare to that of the experimental and control group.

Furthermore, the quasi experimental design aims at testing causal hypotheses, identifying comparison group that is similar as possible to the treatment group. Quasi experiment research design was used because it compares the difference in outcomes between treatment and comparison groups. It aims to verify the magnitude of impact between the variables. It helps in conducting impact evaluations in real world settings whereby preexisting groups or self-selected groups such as individuals are used as experimenting group.

The population of this study was made up of out-of-school emerging adults between the ages 18 to 25 involve in vocational training in the informal sector particularly in mechanic work in Buea Municipality.

The target population of this study comprised of out-of-school emerging adults in Buea Municipality engaged in craftsmanship in mechanic work. It involved out-of-school emerging adults between the ages 18 to 25 in Buea Municipality involved in mechanic work. While the accessible population was made up of twelve (12) out-of-school emerging adults in mechanic garages. That is six (6) apprentice were involve in the study in garage **one**, with three (3) in the experimental group and three (3) in the control group in the same garage. There was also garage **two**, with a total of six apprentice involved in the study, three (3) in the experimental group and three (3) in the control group in the same garage. There was a total of four (4) trainers. Garage **one** had 2 trainers, one (1) for the experimental group and one (1) for the control group and garage **two** had two trainers, one (1) for the experimental group and one (1) for the control group.

Sample and sampling technique

The study was carried in Buea Municipality in the informal sector among out-of-school emerging adults in mechanic work where the sample of the study was drawn. The sample of this study was derived from the accessible population of the study. A sample of 12 apprentice and 4 trainers. The study took place in two garages. The first garage called "The young shall grow garage" located at First Trust Great Soppo below OIC Buea with a total of 6 apprentice in this garage. This garage had three (3) apprentice engaged in the experimental group and three (3) in the control group which was labelled as garage **one**. While garage **two** called "Top ten garage at Checkpoint Buea" with a total of 20 apprentice in the garage. A total of six (6) apprentice were used in the study, three (3) in the experimental group and three (3) in the control group in that same garage. This sample is justified by Goldstein & Pollock (1989) who state that in obtaining best results in any skills training programme, a group of three (3) to six (6) learners is appropriate. Accordingly, small groups enable novices to socially interact and share ideas and give feedback.

The sampling technique used in this study was the purposive sampling technique. The purposed of using the purposive sampling technique was to directly meet with the population of interest. The population of interest consists of out-of-school emerging adults between the age range 18 to 25. Hence, the purposive sampling was to select the population and participants of the study. In fact, the purposive sampling is a type in which the researcher uses his or her judgment to select a sample he or she believes is based on prior information that will provide the information the researcher needs. The researcher purposely administers instructional to those emerging adults engaged in mechanic work and tailoring in Buea Municipality. Furthermore, the purposive sampling technique focused on sampling techniques where the units that were investigated were based on the judgment of the researcher. The purposive sampling technique was used by the researcher for convenient purposes.

Table: Sample Size of the study

Experimental Group		Control Group	
Mechanic Work in Garage **One** for apprentice	3	Mechanic Work in Garage **One** for apprentice	3
Trainers engaged in Garage **One**	1	Trainers engaged in Garage **One**	1
Total	**6**	**Total**	**6**
Mechanic work in Garage **Two** for apprentice	3	Mechanic work in Garage **Two** for apprentice	3
Trainers engaged in Garage **Two**	1	Trainers engaged in Garage **Two**	1
Total	**6**	**Total**	**6**
Total Sample	**12 Apprentice in Garage One and Garage Two 4 Trainers in Garage One and Garage Two**		

The sample of this study comprised of 6 apprentice in Garage **one**, that is 3 in the experimental group and 3 in the control group and another 6 apprentice in Garage **two**, 3 in the experimental group and 3 in the control group making a total sample of 12 apprentice. A total of 4 trainers, 2 in garage **one**, 1 in the experimental group and one in the control group for garage **one** and for garage **two**, 1 trainer in the experimental group and 1 in the control group.

Age **Table: Distribution of apprentices with respect to age**

Category				Age		Total
				18-20	21-23	
Workshop 1	Code	Experimental	n	2	1	3
			%	66.7%	33.3%	100.0%
		Control	n	2	1	3
			%	66.7%	33.3%	100.0%
	Total		n	4	2	6
			%	66.7%	33.3%	100.0%
Workshop 2	Code	Experimental	n	2	1	3
			%	66.7%	33.3%	100.0%
		Control	n	0	3	3
			%	0.0%	100.0%	100.0%
	Total		n	2	4	6
			%	33.3%	66.7%	100.0%
Total	Code	Experimental	n	4	2	6
			%	66.7%	33.3%	100.0%
		Control	n	2	4	6
			%	33.3%	66.7%	100.0%
	Total		n	6	6	12
			%	50.0%	50.0%	100.0%

Apprentices were all aged 18-23 years. This was good was the homogeneity of the sample.
As for workshop 1, the distribution of aged was the same in the control of experimental group with proportion of those aged 18-20 years been 66.7% as against 33.3% for those aged 21-23 years.

As for workshop 2, the distribution was the same as for the mechanics in the experimental group, but in the control group, all of them were aged 21-23 years. This however was not a big problem because as earlier mentioned; age range 18-23 years,

Description of workshops

Table: Description of workshops

Indicators	Workshop 1		Workshop 2	
	Experimental	Control	Experimental	Control
Location of workshop	Great Soppo	Great Soppo	Molyko	Molyko
Master's age	41-65	25-40	41-65	25-40
Master's gender	Male	Male	Male	Male
Like the field of intervention	Yes	Yes	Yes	Yes
Socio-economic status	Moderate	Moderate	Moderate	Moderate
Level of school attained	FSLC	Ordinary level	Primary school	Ordinary level
Marital status	Married	Single	Married	Married
Religion	Christian	Christian	Christian	Christian

Socio-economic status

Table: Distribution of apprentices with respect to specialization and socio-economic status

Category				Socio-economic status		Total
				Low	Moderate	
Mechanic Workshop 1	Code	Experimental	**N**	2	1	3
			%	66.7%	33.3%	100.0%
		Control	**N**	0	3	3
			%	0.0%	100.0%	100.0%
	Total		**N**	2	4	6
			%	33.3%	66.7%	100.0%
Mechanic Workshop 2	Code	Experimental	**N**	3	0	3
			%	100.0%	0.0%	100.0%
		Control	**N**	2	1	3
			%	66.7%	33.3%	100.0%
	Total		**N**	5	1	6
			%	83.3%	16.7%	100.0%

Total	Code	Experimental	**N**	5	1	6
			%	83.3%	16.7%	100.0%
		Control	**N**	2	4	6
			%	33.3%	66.7%	100.0%
	Total		**N**	7	5	12
			%	58.3%	41.7%	100.0%

More of the apprentices had low economic status with 58.3% (7) as against 41.7% (5) those with moderate economic status. None of them acknowledged high economic status. This therefore implies that apprentices were relatively homogenous in their economic status, which was good for the homogeneity and validity of the sample.

Level of school attained

Table: Distribution of apprentices with respect to specialization and level of school attained

Category				Level of school attained		Total
				FSLC	Ordinary level	
Mechanic workshop 1	Code	Experimental	N	2	1	3
			%	66.7%	33.3%	100.0%
		Control	N	1	2	3
			%	33.3%	66.7%	100.0%
	Total		N	3	3	6
			%	50.0%	50.0%	100.0%
Mechanic workshop 2	Code	Experimental	N	1	2	3
			%	33.3%	66.7%	100.0%
		Control	N	2	1	3
			%	66.7%	33.3%	100.0%
	Total		N	3	3	6
			%	50.0%	50.0%	100.0%
Total	Code	Experimental	N	3	3	6
			%	50.0%	50.0%	100.0%
		Control	N	3	3	6
			%	50.0%	50.0%	100.0%
	Total		N	6	3	12
			%	50.0%	25.0%	1000.0%

Apprentices were equally shared between FSLC and ordinary level in both control and experimental groups. This was good for the homogeneity and validity of the sample.

Instrument for data collection

The following methods was used to gather information from the correspondence. A questionnaire of 5 items per objective was conducted, an observational checklist was also designed that had statements from the following measures, scaffolding, and productive and productive learning measured the following; aptitude, mastery experience, attitude, discipline, knowledge, skills and competency development. A lesson note was prepared for mechanic work for the intervention with the used of the experiential learning as a teaching method. The intervention teaching lesson was made up of the following measures coaching, scaffolding, executive functioning and productive learning.

Reliability analysis

Reliability on the other hand refers to the consistency of measurement. It equally refers to the consistency, dependability, accuracy and precision with an instrument measures the attributes it is out to measure. In this study, a pretest and posttest was carried to measure the level of consistency of the variable under study. The statistical test used in this study was Cronbach's alpha which was used to measure internal consistency.

Reliability analysis

Table: Reliability analysis for the observation of apprentices in mechanic workshop 1

Test component	Cronbach's Alpha	N_{cases}	N_{items}
Scaffolding	0.610	6	5
Productive learning	0.618	6	5
IVM	0.755	6	20

As for the observation of apprentice in a mechanic workshop 1, the internal consistency assumption was not violated with Cronbach Alpha reliability coefficients ranging from 0.509 to 0.755, all up to the expected threshold of 0.5 or above.

Table: Reliability analysis for the observation of apprentices in mechanic workshop 2

Test component	Cronbach's Alpha	N_{cases}	N_{items}
Scaffolding	0.610	6	5
Productive learning	0.500	6	5
IVM	0.695	6	20

As for the observation of apprentice in a mechanic workshop 2, the internal consistency assumption was not violated with Cronbach Alpha reliability coefficients ranging from 0.502 to 0.695, all up to the expected threshold of 0.5 or above.

Table: Reliability analysis for the evaluation of apprentices in mechanic workshop 1 & 2

Test component	Cronbach's Alpha	N_{cases}	N_{items}
Scaffolding	0.510	12	5
Productive learning	0.653	12	5
IVM	0.789	12	20

As for the evaluation of apprentice in the two mechanic workshops, the internal consistency assumption was not violated with Cronbach Alpha reliability coefficients ranging from 0.510 to 0.789, all up to the expected threshold of 0.5 or above.

Methods of data processing and analysis

Two mechanic workshops were involved in this quasi-experimental study. Data was analyzed for the two workshops separately, then for the two workshops combined.

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Data Entry and Clean up

Quantitative data was entered using EpiData Version 3.1 (EpiData Association, Odense Denmark, 2008) and analyzed using the Statistical Package for Social Sciences (SPSS) Standard version, Release 21.0 (IBM Inc. 2012). Data cleanup (content cleanup and exploratory statistics): Exploratory statistics is an integrated part of data cleanup. Variables were explored to identify questionable entries, inconsistency in responses and outliers and their validity discussed to make the necessary corrections (Nana, 2015). During this stage, the fate of missing data was defined. Some were set as missing and some recoded depending on the statistical requirements. Invalid codes prospectively were not supposed to exist as entries were initially checked in EpiData using suitable algorithms or machine language.

Test of hypotheses

Cohen's *d* was used to compare assert significant difference. In fact, if we followed the steps to estimate power sampling, we then realize that it is possible to estimate a parameter when others are known. If this is the case, then, we can estimate a theoretical effect size at a given power when the sample size is known as well as alpha. By comparing this (Theoretical effect size) with the real one (Effect Size from the real experiment or study), we expect the Effect Size from the real experiment to be less than the Theoretical effect size for us to assert that the difference observed is really significant. In fact, there is type I error if one rejects the null hypothesis when it is true and there is type II error when one accepts the null hypothesis when it is false. This is common when the sample size is small or inadequate or the power use to estimate the sample size is weak. In the context of this study, the sample size is really nominal, 3 for each cohort under comparison and test that are very sensitive to sample size like t-test and non-parametric counterparts like Mann Whitney, Wilcoxon Signed Rank test etc. are no longer suitable. The suitable alternative here is to verify this hypothesis by comparing effect sizes, using Cohen's *d* . This will be done using Gpower 3.1.9.2 released 2014. How do we proceed? Let us first of all see how power sampling enables us to estimate sample size as to minimize Type I and Type II error.

Type I errors are controlled by choosing the significance level. The smaller the significance level, the higher our chance to minimize type I error. A 5% level means that on average 1/20 comparisons will be "significant" when they are just due to sampling variation. A researcher working with 1% significance level had higher chance of avoiding type I error as compared to the one working at 5% and much more than the one working at 10%. So the smaller the Alpha, the higher the number of comparisons or the sample size and the lower the propensity for Type I error.

Control of Type II errors is more difficult as it depends on the relationship among several variables, the most important of which are the "signal" (difference between means of the groups), the "noise" (inter-individual variability) and the sample size. We can often use power analysis to estimate the required sample size as discussed below. Among these parameters, only the sample size can be controlled mathematically by using a good power to estimate the sample size, and the rest are related to experimental layout which depends on the researcher and his sense of procedural rigor.

FINDINGS

Master

Table: Characterization of scaffolding by master in mechanic workshop 1 based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Expert directs novices to select right screw of untightening a car which enable them gain attention and selective attention skills	0	1	0	1	1	0	0	1
Expert gives assistance for novices to connect parts of the car perfectly	0	1	0	1	1	0	0	1
Expert provide feedback for participants to remove the tire of the car whom they gain problem solving skills	1	0	0	1	1	0	0	1
Expert observe and give cues to novices to solve certain breakdown in the car	1	0	1	0	1	0	1	0
Expert self-direct participants to handle measure breakdowns in the car	0	1	1	0	0	1	1	0
MRS	40% (2)	60.0% (3)	40.0% (2)	60.0% (3)	80% (4)	20.0% (1)	40.0% (2)	60.0% (3)

A proprotion of 40.0% of masters in mechanic workshop 1, had good coaching at pretest in the experimental group and this proprotion rose to 80% at posttest following the intervention. In the control group, this proprotion was 40% at pretest and almost stagnated at 40% at posttest.

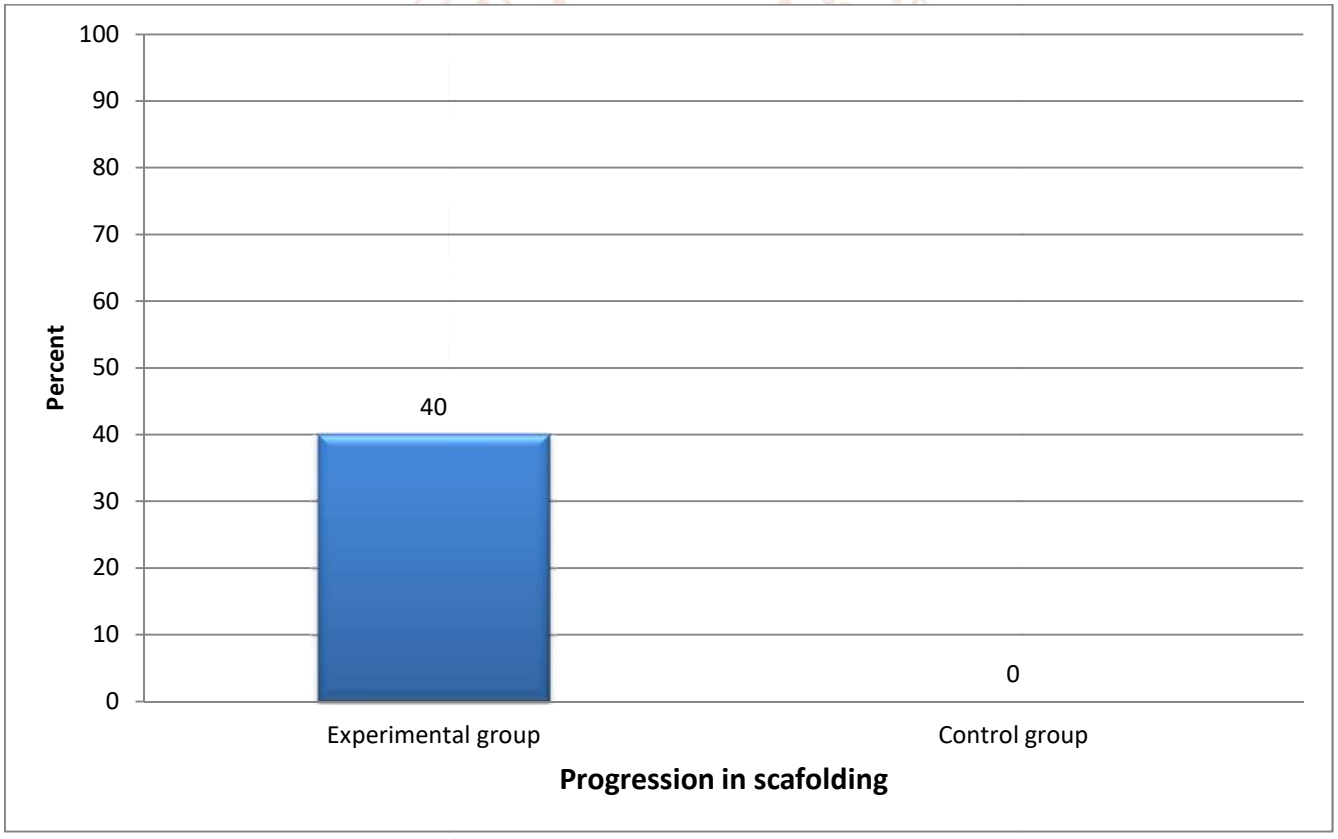


Figure: Progression in scaffolding for master in mechanic workshop 1

As for masters in mechanic workshop 1, in the experimental group, there was a progression rate of 40% as against 0% in the control group.

Apprentice

Table: Characterization of response to scaffolding by apprentices in mechanic workshop 1 based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Participant easily select right screw of untightening a car when provided assistance	0.0% (0)	100% (3)	66.7% (2)	33.3% (1)	100% (3)	0.0% (0)	66.7% (2)	33.3% (1)
Participant do connect parts of the car perfectly when provided support	33.3% (1)	66.7% (2)	33.3% (1)	66.7% (2)	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)
Participant find it easy to remove the tire of the car even after receiving feedback	33.3% (1)	66.7% (2)	0.0% (0)	100% (3)	66.7% (2)	33.3% (1)	33.3% (1)	66.7% (2)
Participant do solve some heating problems faced by the car when provided cues	33.3% (1)	66.7% (2)	66.7% (2)	33.3% (1)	66.7% (2)	33.3% (1)	33.3% (1)	66.7% (2)
Participant do use the right screw to work on the car when self-directed by the expert	66.7% (2)	33.3% (1)	33.3% (1)	66.7% (2)	66.7% (2)	33.3% (1)	66.7% (2)	33.3% (1)
MRS	33.3% (5)	66.7% (10)	40.0% (6)	60.0% (9)	80.0% (12)	20.% (3)	46.7% (7)	53.3% (8)

A proprotion of 33.3% of mechanic apprenctcies in workshop 1 had good response to scaffolding at pretest in the experimental group and this proprotion rose to 80.0% at posttest following the intervention.In the control group, this proprotion was 40.0% at pretest and rose slightly at 46.7% at posttest.

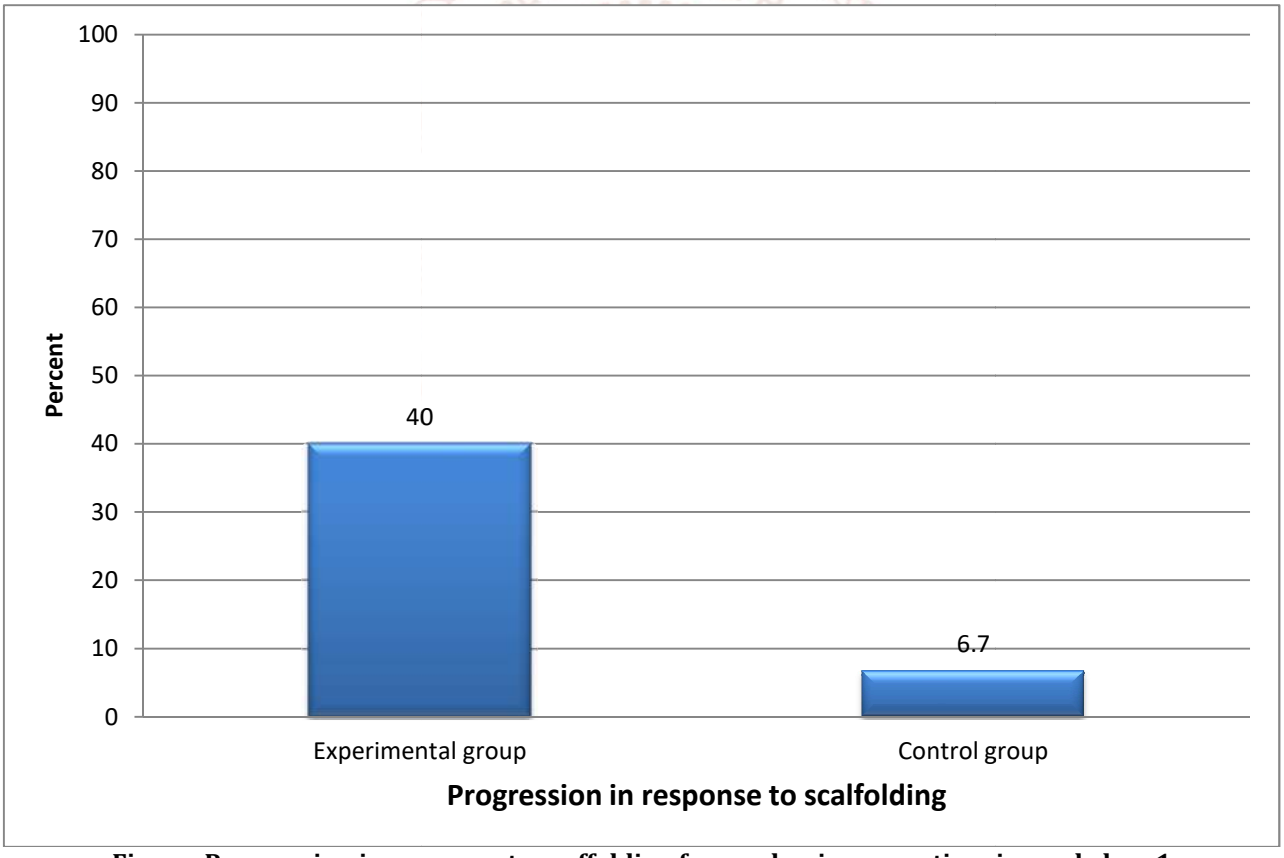


Figure: Progression in response to scaffolding for mechanic apprentices in workshop 1

As for apprentice mechanics in workshop 1, in the experimental group, there was a progression rate of 33.3% as against 6.7% in the control group.

Mechanic workshop 2

Master

Table: Characterization of scaffolding by master in mechanic workshop 2 based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Expert directs novices to select right screw of untightening a car which enable them gain attention and selective attention skills	1	0	1	0	1	0	0	1
Expert gives assistance for novices to connect parts of the car perfectly	0	1	0	1	1	0	0	1
Expert provide feedback for participants to remove the tire of the car whom they gain problem solving skills	0	1	0	1	1	0	0	1
Expert observe and give cues to novices to solve certain breakdown in the car	0	1	0	1	1	0	1	0
Expert self-direct participants to handle measure breakdowns in the car	0	1	0	1	1	0	1	0
MRS	20.0% (1)	80% (4)	20.0% (1)	80.0% (4)	100% (5)	0.0% (0)	40.0% (2)	60.0% (3)

A proprotion of 20.0% of masters in mechanic workshop 2 had good scaffolding at pretest in the experimental group and this proprotion rose to 100% at posttest following the intervention.In the control group, this proprotion was 20% at pretest and rose to 40% at posttest.

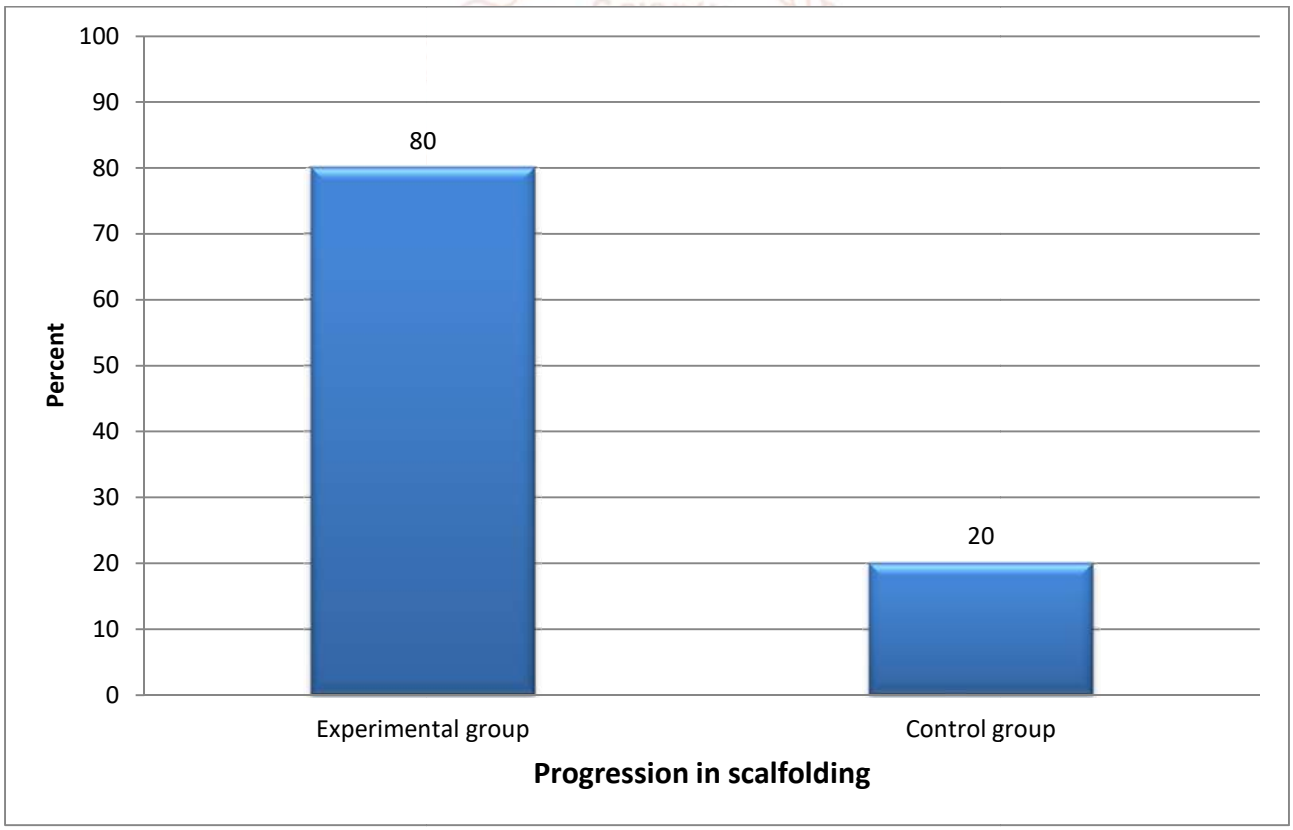


Figure: Progression in scaffolding for masters in mechanic workshop 2

As for master in mechanic workshop 2, in the experimental group, there was a progression rate of 80% as against 20% in the control group.

Apprentice

Table: Characterization of response to scaffolding by apprentices in mechanic workshop 2 based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Participant easily select right screw of untightening a car when provided assistance	66.7% (2)	33.3% (1)	0.0% (0)	66.7% (2)	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)

Participant do connect parts of the car perfectly when provided support	33.3% (1)	66.7% (2)	33.3% (1)	66.7% (2)	100% (3)	0.0% (0)	66.7% (2)	33.3% (1)
Participant find it easy to remove the tire of the car even after receiving feedback	0.0% (0)	100% (3)	33.3% (1)	66.7% (2)	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)
Participant do solve some heating problems faced by the car when provided cues	66.7% (2)	33.3% (1)	66.7% (2)	66.7% (2)	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)
Participant do use the right screw to work on the car when self-directed by the expert	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)	100% (3)	0.0% (0)	33.3% (1)	66.7% (2)
MRS	53.3% (8)	46.7% (7)	33.3% (5)	66.7% (10)	100% (15)	0.0% (0)	40.0% (6)	60.0% (9)

A proprotion of 53.3% of mechanic apprenctces in workshop 2 had good response to scaffolding at pretest in the experimental group and this proprotion rose to 100% at posttest following the intervention. In the control group, this proprotion was 33.3% at pretest and rose slightly to 40.0% at posttest.

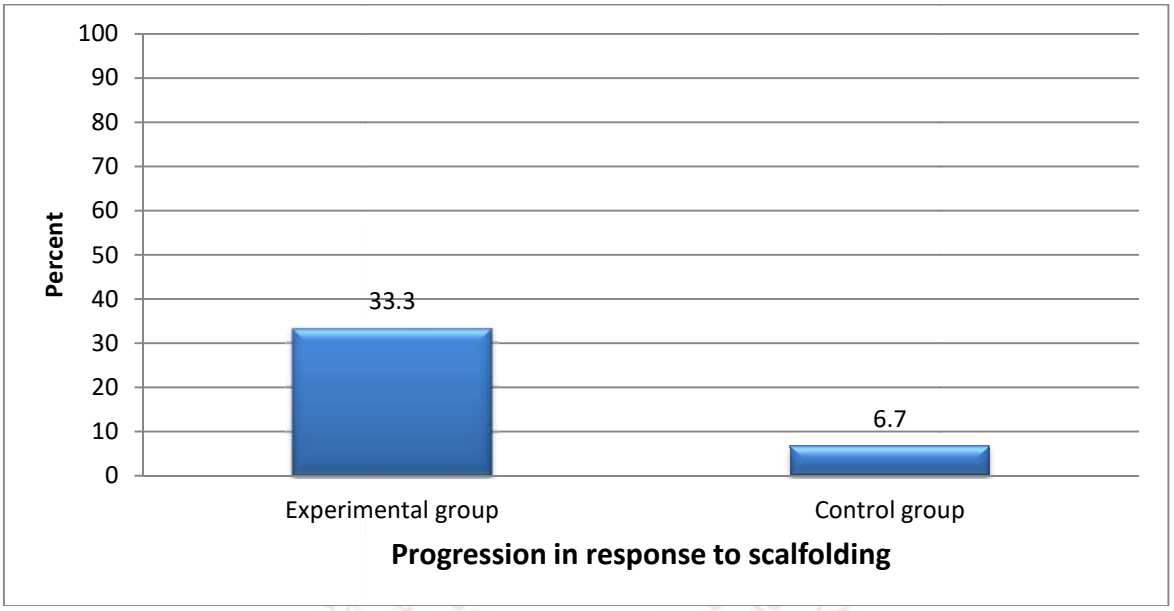
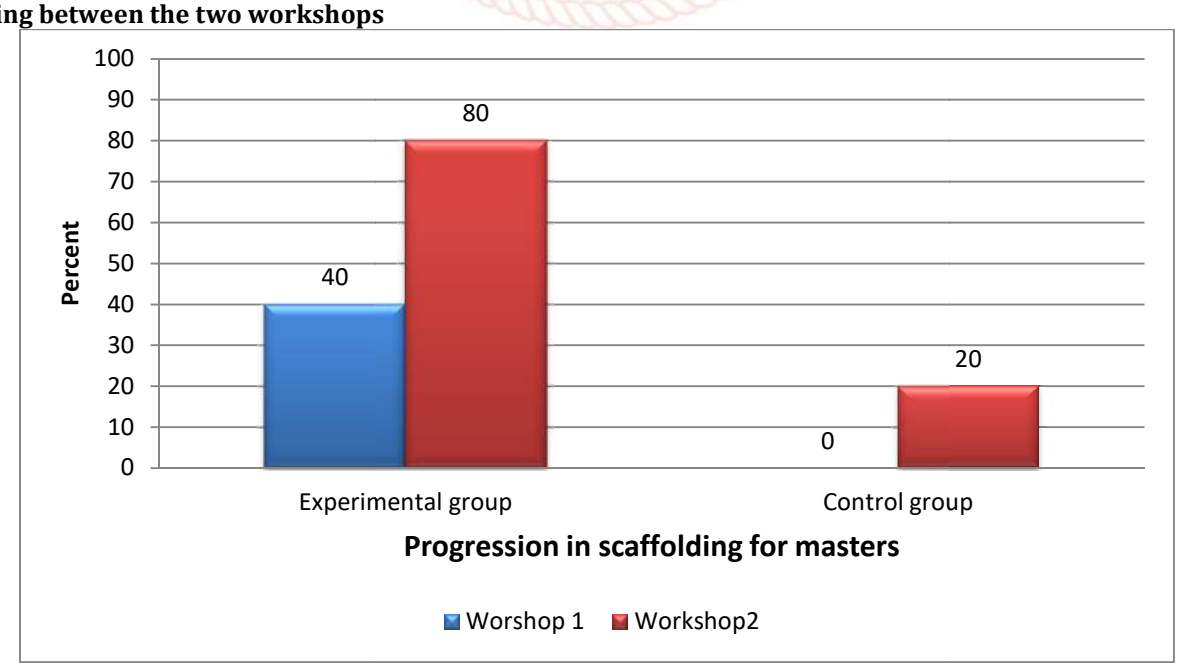


Figure: Progression in response to scaffolding for mechanic apprentices in workshop 2

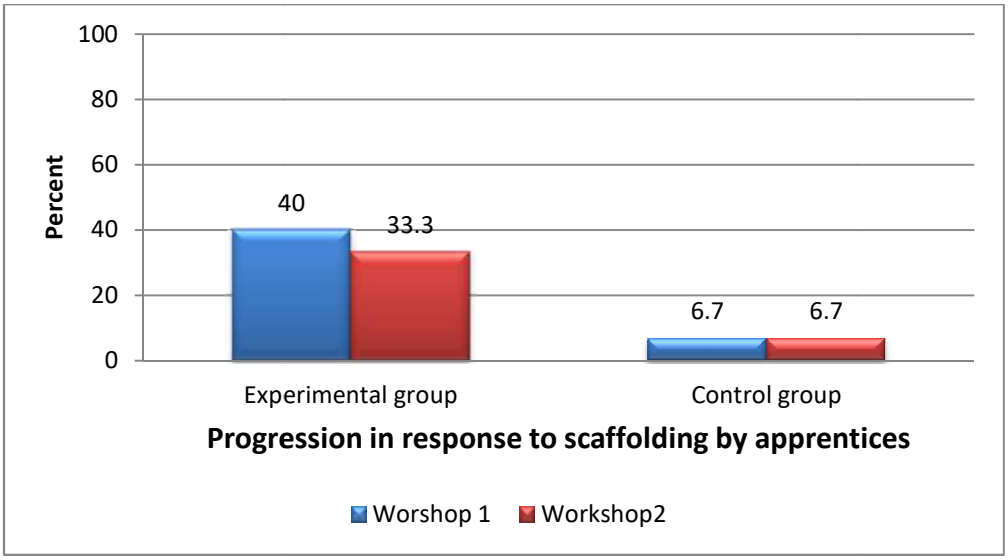
As for apprentice mechanics in workshop 2, in the experimental group, there was a progression rate of 33.3% as against 6.7% in the control group.

Comparing between the two workshops



χ2-test: χ2=0.42, df=1; P=0.519

Figure: Progression in scaffolding for masters, comparing between the two workshops



χ2-test: χ2=0.42, df=1; P=0.519

Figure: Progression in response in scaffolding for apprentices, comparing between the two workshops

There was no significant difference between the two workshops for both masters and mechanics (P>0.05).

Combining mechanic workshop 1 & 2

Master

Table: Characterization of scaffolding by master in mechanic workshops 1 & 2 based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Expert directs novices to select right screw of untightening a car which enable them gain attention and selective attention skills	1	1	1	1	2	0	0	2
Expert gives assistance for novices to connect parts of the car perfectly	0	2	0	2	2	0	0	2
Expert provide feedback for participants to remove the tire of the car whom they gain problem solving skills	1	1	0	2	2	0	0	2
Expert observe and give cues to novices to solve certain breakdown in the car	1	1	1	1	2	0	2	0
Expert self-direct participants to handle measure breakdowns in the car	0	2	1	1	1	1	2	0
MRS	30.0% (3)	70% (7)	30.0% (3)	70.0% (7)	90% (9)	10.0% (1)	40.0% (4)	60.0% (6)

A proprotion of 30.0% of masters in mechanic workshops 1 & 2 had good scaffolding at pretest in the experimental group and this proprotion rose to 90% at posttest following the intervention.In the control group, this proprotion was 30% at pretest and rose slightly to 40% at posttest.

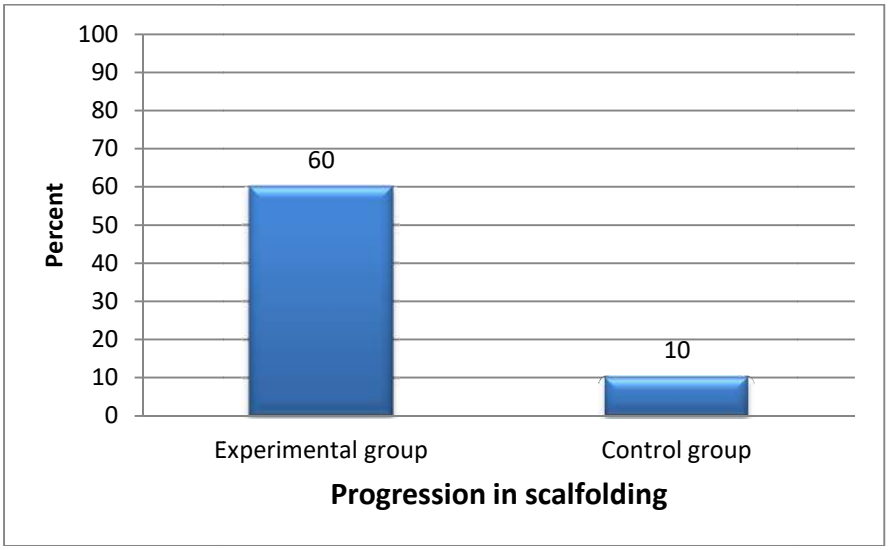


Figure: Progression in scaffolding for master mechanics in workshops 1 & 2

As for masters in mechanic in workshops 1 & 2, in the experimental group, there was a progression rate of 60% as against 10% in the control group.

Apprentice

Table: Characterization of response to scaffolding by apprentices in mechanic workshops 1 & 2 based on observation

Items	Pretest				Posttest			
	Experimental		Control		Experimental		Control	
	Good	Poor	Good	Poor	Good	Poor	Good	Poor
Participant easily select right screw of untightening a car when provided assistance	33.3% (2)	66.7% (4)	66.7% (4)	33.3 (2)	100% (6)	0.0% (0)	66.7% (4)	33.3% (2)
Participant do connect parts of the car perfectly when provided support	33.3% (2)	66.7% (4)	33.3% (2)	66.7% (4)	100% (6)	0.0% (0)	33.3% (2)	66.7% (4)
Participant find it easy to remove the tire of the car even after receiving feedback	66.7% (4)	33.3% (2)	0.0% (0)	100.0% (6)	66.7% (4)	33.3% (2)	33.3% (2)	66.7% (4)
Participant do solve some heating problems faced by the car when provided cues	33.3% (2)	66.7% (4)	66.7% (4)	33.3% (2)	100.0% (6)	0.0% (0)	33.3% (2)	66.7% (4)
Participant do use the right screw to work on the car when self-directed by the expert	83.3% (5)	16.7% (1)	33.3% (2)	66.7% (4)	66.7% (4)	33.3% (2)	50.0% (3)	50.0% (3)
MRS	50.0% (15)	50.0% (15)	40.0% (12)	60.0% (18)	80.0% (24)	20.0% (6)	43.3% (13)	56.7% (17)

A proprotion of 50.0% of mechanic apprenctices had good response to scaffolding at pretest in the experimental group and this proprotion rose to 80.0% at posttest following the intervention. In the control group, this proprotion was 40.0% at pretest and almost stagnated at 43.3% at posttest.

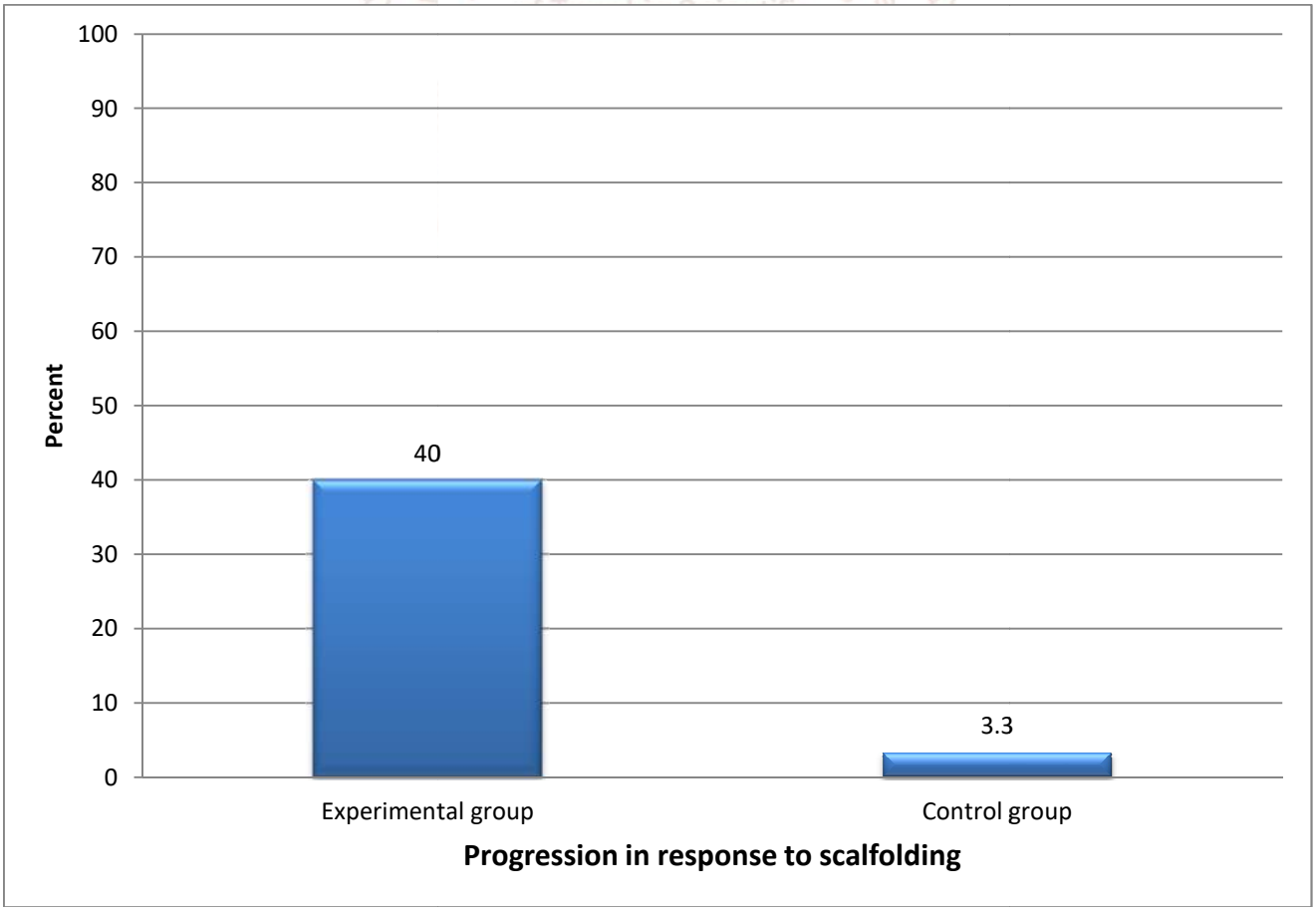


Figure: Progression in response in scaffolding for mechanic apprentices in workshops 1 & 2

As for apprentices in mechanic in the two workshops, in the experimental group, there was a progression rate of 40% as against a drop of 6.7% in the control group.

Apprentices' perceptions
Scaffolding
Workshop 1

Table: Characterization of scaffolding in the experimental group for apprentices in mechanic workshop 1 at pretest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
My patron direct me on the kind of screw to use to tighten the nodes of the car	66.7% (2)	0.0% (0)	33.3% (1)	0.0% (0)	66.7% (2)	33.3% (1)
My patron assist me on how to hold the brake of the car when there is a fault	100.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
My patron provide me with reminders to locate particular faults in the car	33.3% (1)	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
Directives is being given to novices to check the engine of the car	100.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	33.3% (1)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (1)	66.7% (2)
MRS	66.7% (10)	0.0% (0)	26.7% (4)	6.7% (1)	66.7% (10)	33.3% (5)

A proprotion of 66.7% of mechanic apprenctices perceived good scaffolding at pretest in the experimental group in workshop 1.

Table: Characterization of scaffolding in the experimental group for apprentices in mechanic workshop 1 at posttest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
My patron direct me on the kind of screw to use to tighten the nodes of the car	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
My patron assist me on how to hold the brake of the car when there is a fault	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
My patron provide me with reminders to locate particular faults in the car	33.3% (1)	33.3% (1)	33.3% (1)	0.0% (0)	66.6% (2)	33.3% (1)
Directives is being given to novices to check the engine of the car	33.3% (1)	66.7% (2)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
MRS	53.3% (8)	40.0% (6)	6.7% (1)	0.0% (0)	93.3% (14)	6.7% (1)

A proprotion of 93.3% of mechanic apprenctices perceived good scaffolding at posttest in the experimental group in workshop 1. There was a progression of 26.6%.

Table: Characterization of scaffolding in the control group for apprentices in mechanic workshop 1 at pretest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
My patron direct me on the kind of screw to use to tighten the nodes of the car	0.0% (0)	0.0% (0)	66.7% (2)	33.3% (1)	0.0% (0)	100.0% (3)
My patron assist me on how to hold the brake of the car when there is a fault	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
My patron provide me with reminders to locate particular faults in the car	0.0% (0)	0.0% (0)	66.7% (2)	33.3% (1)	0.0% (0)	100.0% (3)
Directives is being given to novices to check the engine of the car	33.3% (1)	33.3% (1)	0.0% (0)	33.3% (1)	66.6% (2)	33.3% (1)
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	33.3% (1)	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
MRS	26.7% (4)	13.3% (2)	33.3% (5)	26.7% (4)	40.0% (6)	60.0% (9)

A proprotion of 40.0% of mechanic apprenctices perceived good scaffolding at pretest in the control group in workshop 1.

Table: Characterization of scaffolding in the control group for apprentices in mechanic workshop 1 at posttest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
My patron direct me on the kind of screw to use to tighten the nodes of the car	66.7% (2)	0.0% (0)	33.3% (1)	0.0% (0)	66.7% (2)	33.3% (1)
My patron assist me on how to hold the brake of the car when there is a fault	33.3% (1)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (1)	66.7% (2)
My patron provide me with reminders to locate particular faults in the car	100.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Directives is being given to novices to check the engine of the car	66.7% (2)	0.0% (0)	33.3% (1)	0.0% (0)	66.7% (2)	33.3% (1)
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	33.3% (1)	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
MRS	60.0% (9)	0.0% (0)	33.3% (5)	6.6% (1)	60.0% (9)	40.0% (6)

A proprotion of 60.0% of mechanic apprenctices perceived good scaffolding at posttest in the control group in workshop 1. There was a progression of 20.0%.

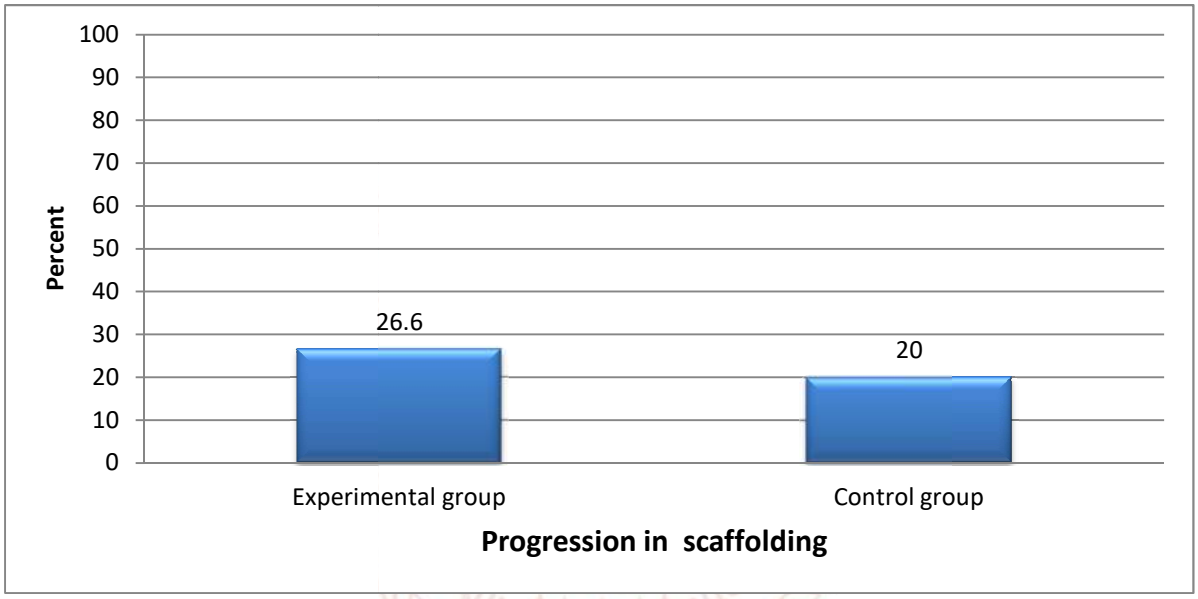


Figure: Comparing apprentices perceived progression in good scaffolding between experimental and control group in workshop 1

Progression was higher in the experimental group with proportion of 26.6% as compared to 20.0% in the control group.

Workshop 2

Table: Characterization of scaffolding in the experimental group for apprentices in mechanic workshop 2 at pretest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
My patron direct me on the kind of screw to use to tighten the nodes of the car	100.0% (3)	0.0% (0)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
My patron assist me on how to hold the brake of the car when there is a fault	33.3% (1)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (1)	66.7% (2)
My patron provide me with reminders to locate particular faults in the car	66.7% (2)	0.0% (0)	33.3% (1)	0.0% (0)	66.7% (2)	33.3% (1)
Directives is being given to novices to check the engine of the car	66.7% (2)	0.0% (0)	33.3% (1)	0.0% (0)	66.7% (2)	33.3% (1)
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	66.7% (2)	0.0% (0)	0.0% (0)	33.3% (1)	66.7% (2)	33.3% (1)
MRS	66.7% (10)	0.0% (0)	26.7% (4)	6.6% (1)	66..7% (10)	33.3% (5)

A proprotion of 66.7% of mechanic apprenctices perceived good scaffolding at pretest in the experimental group in workshop 2

Table: Characterization of scaffolding in the experimental group for apprentices in mechanic workshop 2 at postest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
My patron direct me on the kind of screw to use to tighten the nodes of the car	33.3% (1)	66.7% (2)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
My patron assist me on how to hold the brake of the car when there is a fault	33.3% (1)	66.7% (2)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
My patron provide me with reminders to locate particular faults in the car	33.3% (1)	66.7% (2)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
Directives is being given to novices to check the engine of the car	33.3% (1)	33.3% (1)	33.3% (1)	0.0% (0)	66.6% (2)	33.3% (1)
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	66.7% (2)	33.3% (1)	0.0% (0)	0.0% (0)	100.0% (3)	0.0% (0)
MRS	40.0% (6)	53.3% (8)	6.6% (1)	0.0% (0)	93.3% (14)	6.6% (1)

A proprotion of 93.3% of mechanic apprenctices perceived good scaffolding at pretest in the experimental group in workshop 2. Therefore, there was a progression of 26.6%.

Table: Characterization of scaffolding in the control group for apprentices in mechanic workshop 2 at pretest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Disagree	A&SA	D&SD
My patron direct me on the kind of screw to use to tighten the nodes of the car	0.0% (0)	0.0% (0)	66.7% (2)	33.3% (1)	0.0% (0)	100.0% (3)
My patron assist me on how to hold the brake of the car when there is a fault	33.3% (1)	33.3% (1)	33.3% (1)	0.0% (0)	66.6% (2)	33.3% (1)
My patron provide me with reminders to locate particular faults in the car	0.0% (0)	0.0% (0)	66.7% (2)	33.3% (1)	0.0% (0)	100.0% (3)
Directives is being given to novices to check the engine of the car	33.3% (1)	33.3% (1)	0.0% (0)	33.3% (1)	66.6% (2)	33.3% (1)
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	33.3% (1)	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
MRS	20.0% (3)	13.3% (2)	40.0% (6)	26.7% (4)	33.3% (5)	66.7% (10)

A proprotion of 33.3% of mechanic apprenctices perceived good scaffolding at posttest in the control group in workshop 2.

Table: Characterization of scaffolding in the control group for apprentices in mechanic workshop 2 at posttest

Item	Stretched				Collapsed	
	Agree	Strongly Agree	Disagree	Strongly Agree	A&SA	D&SD
My patron direct me on the kind of screw to use to tighten the nodes of the car	33.3% (1)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (1)	66.7% (2)
My patron assist me on how to hold the brake of the car when there is a fault	33.3% (1)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (1)	66.7% (2)
My patron provide me with reminders to locate particular faults in the car	66.7% (2)	0.0% (0)	0.0% (0)	33.3% (1)	66.7% (2)	33.3% (1)
Directives is being given to novices to check the engine of the car	33.3% (1)	0.0% (0)	66.7% (2)	0.0% (0)	33.3% (1)	66.7% (2)
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	33.3% (1)	0.0% (0)	33.3% (1)	33.3% (1)	33.3% (1)	66.6% (2)
MRS	40.0% (6)	0.0% (0)	46.7% (7)	13.3% (2)	40.0% (6)	60.0% (9)

A proprotion of 40.0% of mechanic apprenctices perceived good scaffolding at posttest in the control group in workshop 2.

Therefore there was a progression of 6.7%.

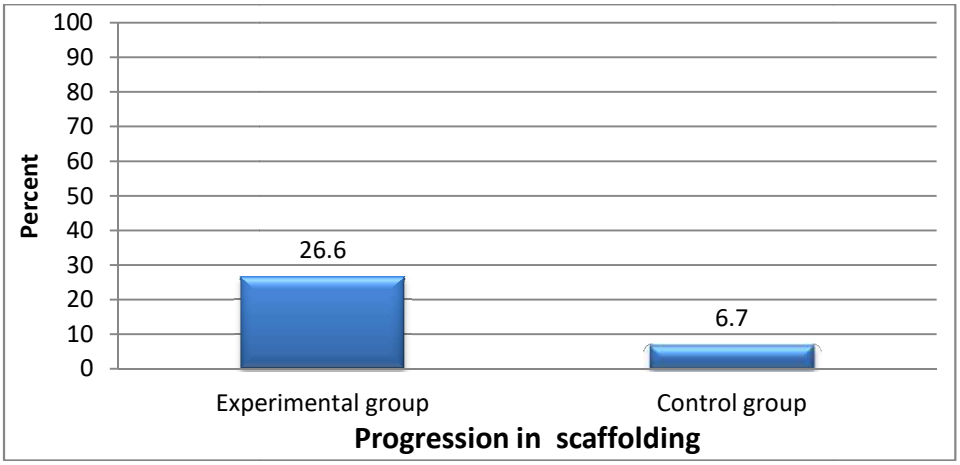


Figure 35: Comparing apprentices perceived progression in good scaffolding between experimental and control group in workshop 2

Progression was higher in the experimental group with proportion of 26.6% as compared to 6.7% in the control group.

Comparing between workshops 1 & 2

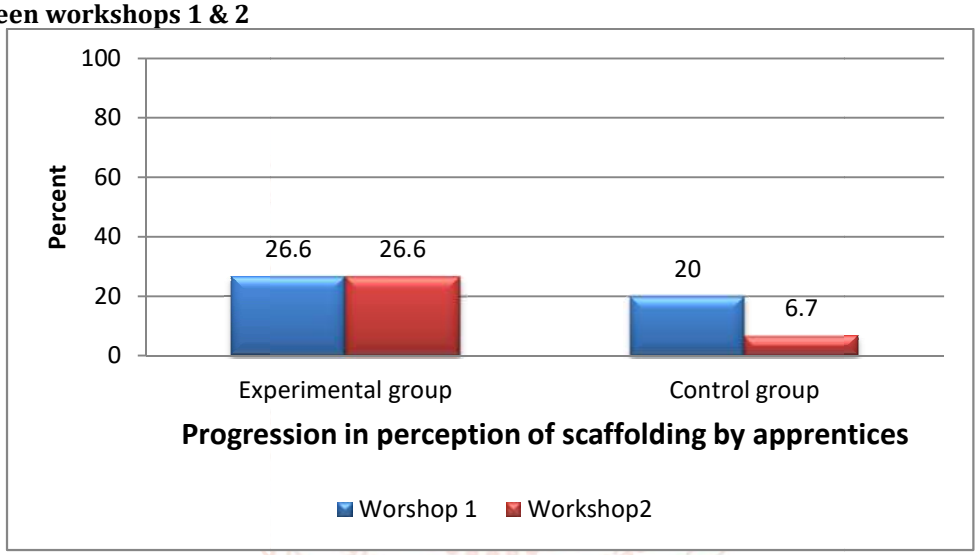


Figure: Comparing apprentices perceived progression in good scaffolding between workshop 1 & 2

In both workshops, progression was higher in the experimental group though the gap between the experimental and control group was narrower in workshop 1.

Combining workshop 1 & 2

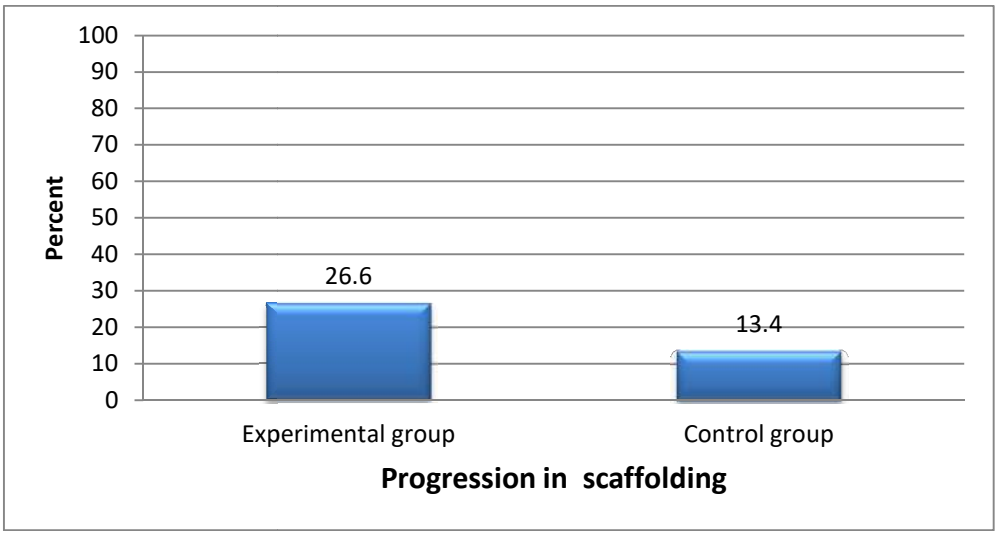


Figure: Comparing progression between control and experimental group for workshop 1 & 2 combined

Progression was higher in the experimental group (26.6%) as compared to 13.4% for the control group.

Research Hypothesis: There is no significant relationship between scaffolding and productive learning skills among emerging adults engaged in tailoring and mechanic work in Buea Municipality.

Mechanic workshop 1

Table 65: Comparing change in score in scaffolding from pretest to posttest in the experimental group for apprentices in mechanic workshop 1

		Test Level		Mean difference
		Pretest	Posttest	
My patron direct me on the kind of screw to use to tighten the nodes of the car	N	3	3	
	Mean	1.67	2.67	1.0
	Median	1.00	1.50	
	Std. Deviation	0.500	0.423	
My patron assist me on how to hold the brake of the car when there is a fault	N	3	3	
	Mean	1.33	2.00	0.67
	Median	1.00	2.00	
	Std. Deviation	.577	0.695	
My patron provide me with reminders to locate particular faults in the car	N	3	3	
	Mean	1.67	2.33	0.66
	Median	1.00	2.00	
	Std. Deviation	0.426	0.345	
Directives is being given to novices to check the engine of the car	N	3	3	
	Mean	1.67	2.33	0.66
	Median	2.00	3.00	
	Std. Deviation	.577	0.533	
Feedback is always given to apprentices after diagnosing problems in the car by the instructor Total score scaffolding	N	3	3	
	Mean	2.00	2.00	0.0
	Median	1.00	2.00	
	Std. Deviation	0.126	0.249	
	N	3	3	
	Mean	8.0011	9.2659	1.3
	Median	7.0000	8.0000	
	Std. Deviation	0.5214	0.3912	
	SD_g	0.331		
	Calculated Effect Size	3.927		
	Theoretical Effect Size	3.589		
	Interpretation (Cohen's *d*)	The theoretical effect size is smaller than the calculated one, we then reject the hypothesis that the means are not different. This therefore implies that there was a significant progression from pre-test to post-test.		

An increase in the quality of scaffolding was realized from pretest to posttest in mechanic workshop 1for 4 indicators out of 5: My patron directs me on the kind of screw to use to tighten the nodes of the car: The mean was 1.67 at pretest and rose to 2.67 at posttest. My patron assists me on how to hold the brake of the car when there is a fault: The mean was 1.33 at pretest and rose to 2.00 at posttest. My patron provides me with reminders to locate particular faults in the car: The mean was 1.67 at pretest at rose to 2.33 at posttest. Directives were being given to novices to check the engine of the car: The mean was 1.67 at pretest and rose to 2.33 at posttest. For this the indicator 'feedback is always given to apprentices after diagnosing problems in the car by the instructor', there was not change as the mean stagnated at 2.00. As for the total score in scaffolding for mechanic in workshop 1 in the experimental group, the mean at pretest was 8.0 and rose to 9.3 at posttest and this increase was significant (negative Cohen's *d*).

Table: Comparing change in score in scaffolding from pretest to posttest in the control group for apprentices in mechanic workshop 1

		Test Level		Mean difference
		Pretest	Posttest	
My patron direct me on the kind of screw to use to tighten the nodes of the car	N	3	3	
	Mean	1.33	1.67	0.34
	Median	1.00	1.00	
	Std. Deviation	0.215	0.300	
My patron assist me on how to hold the brake of the car when there is a fault	N	3	3	
	Mean	1.67	1.00	-0.67
	Median	1.00	1.00	
	Std. Deviation	0.321	.297	

My patron provide me with reminders to locate particular faults in the car	N	3	3	
	Mean	2.50	2.33	-0.17
	Median	1.00	1.33	
	Std. Deviation	0.410	0.367	
Directives is being given to novices to check the engine of the car	N	3	3	
	Mean	1.67	1.00	-0.67
	Median	1.00	1.00	
	Std. Deviation	0.124	0.220	
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	N	3	3	
	Mean	2.00	2.00	0.0
	Median	1.00	0.067	
	Std. Deviation	0.059	0.036	
Total score scaffolding	N	3	3	
	Mean	9.286	8.567	-0.7
	Median	7.0000	6.500	
	Std. Deviation	0.623	0.541	
	SD_g	0.659		
	Calculated Effect Size	1.062		
	Theoretical Effect Size	3.589		
	Interpretation*	The theoretical effect size is bigger than the calculated one. We then accept the hypothesis that the means are not different. This therefore implies that there was no significant progression from pre-test to post-test.		

In the control group for scaffolding in mechanic workshop 1, a slight increase from pretest to posttest was observed for one indicator, that is 'My patron directs me on the kind of screw to use to tighten the nodes of the car' whereby the mean was 1.33 at pretest and rose to 1.67 at posttest. The mean stagnated for 1 indicator, that is 'Feedback is always given to apprentices after diagnosing problems in the car by the instructor' with a value of 2.00 from pretest to posttest. There was a drop in mean for three indicators: My patron assists me on how to hold the brake of the car when there is a fault: The mean was 1.67 at pretest and dropped at 1.00 at posttest. My patron provides me with reminders to locate particular faults in the car: The mean was 2.50 at pretest and dropped at 2.33 at posttest. Directives were being given to novices to check the engine of the car: The mean was 1.67 at pretest and dropped at 1.00 at posttest. In overall, there was a slight dropped in mean from 9.3 at pretest to 8.6 at posttest but this increase was not significant (positive Cohen's d) thus implying no significant change from pretest to posttest.

Mechanic workshop 2

Table: Comparing change in score in scaffolding from pretest to posttest in the experimental group for apprentices in mechanic workshop 2

		Test Level		Mean difference
		Pretest	Posttest	
My patron direct me on the kind of screw to use to tighten the nodes of the car	N	3	3	
	Mean	2.00	3.00	1.0
	Median	1.00	1.00	
	Std. Deviation	0.413	0.356	
My patron assist me on how to hold the brake of the car when there is a fault	N	3	3	
	Mean	1.67	2.33	0.66
	Median	2.00	2.00	
	Std. Deviation	0.367	0.312	
My patron provide me with reminders to locate particular faults in the car	N	3	3	
	Mean	1.67	3.00	1.33
	Median	2.00	3.00	
	Std. Deviation	0.377	0.375	
Directives is being given to novices to check the engine of the car	N	3	3	
	Mean	1.00	3.00	2.00
	Median	1.00	1.00	
	Std. Deviation	0.377	0.500	
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	N	3	3	
	Mean	2.00	2.00	0
	Median	1.00	1.00	
	Std. Deviation	0.123	0.301	

Total score scaffolding	N	3	3	
	Mean	9.0312	10.7745	1.7
	Median	7.0000	10.0000	
	Std. Deviation	0.422	0.612	
	SD_g	0.410		
	Calculated Effect Size	4.146		
	Theoretical Effect Size	3.589		
	Interpretation (Cohen's *d*)	The theoretical effect size is smaller than the calculated one, we then reject the hypothesis that the means are not different. This therefore implies that there was a significant progression from pre-test to post-test.		

An increase in the quality of scaffolding was realized from pretest to posttest in the experimental group for mechanic in workshop 2 for 4 of the 5 indicators: My patron directs me on the kind of screw to use to tighten the nodes of the car: The mean was 2.0 at pretest and rose to 3.00 at posttest. My patron assists me on how to hold the brake of the car when there is a fault: The mean was 1.67 at pretest and rose to 2.33 at posttest. My patron provides me with reminders to locate particular faults in the car: The mean was 1.67 at pretest at rose to 3.00 at posttest. Directives were being given to novices to check the engine of the car: The mean was 1.00 at pretest and rose to 3.00 at posttest. As for the indicator 'feedback is always given to apprentices after diagnosing problems in the car by the instructor' the mean stagnated at 2.0 from pretest to posttest. As for the total score in scaffolding for mechanic in workshop 2 in the experimental group, the mean at pretest was 9.0 and rose to 10.7 at posttest and this increase was significant (negative Cohen's *d*).

Table: Comparing change in score in scaffolding from pretest to posttest in the control group for apprentices in mechanic workshop 2

		Test Level		Mean difference
		Pretest	Posttest	
My patron direct me on the kind of screw to use to tighten the nodes of the car	N	3	3	
	Mean	2.50	2.33	-0.17
	Median	3.00	3.00	
	Std. Deviation	0.235	0.456	
My patron assist me on how to hold the brake of the car when there is a fault	N	3	3	
	Mean	2.00	2.00	0
	Median	1.00	1.00	
	Std. Deviation	0.419	0.516	
My patron provide me with reminders to locate particular faults in the car	N	3	3	
	Mean	2.50	2.33	-0.17
	Median	1.00	2.00	
	Std. Deviation	0.314	0.210	
Directives is being given to novices to check the engine of the car	N	3	3	
	Mean	1.00	2.00	1.0
	Median	0.067	1.00	
	Std. Deviation	0.111	0.098	
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	N	3	3	
	Mean	1.67	1.00	-0.67
	Median	1.00	1.00	
	Std. Deviation	0.562	0.300	
Total score scaffolding	N	3	3	
	Mean	9.6489	9.5230	-0.1
	Median	6.000	7.5000	
	Std. Deviation	0.6100	0.7230	
	SD_g	0.510		
	Calculated Effect Size	0.196		
	Theoretical Effect Size	3.589		
	Interpretation*	The theoretical effect size is bigger than the calculated one. We then accept the hypothesis that the means are not different. This therefore implies that there was no significant progression from pre-test to post-test.		

In the control group for scaffolding in mechanic workshop 2, an increase from pretest to posttest was observed for one indicator, that is 'Directives is being given to novices to check the engine of the car' whereby the mean was 1.00 at pretest and rose to 2.00 at posttest.

The mean stagnated for 1 indicator: My patron assists me on how to hold the brake of the car when there is a fault: the mean was 2.00 at pretest and stagnated at posttest. As for the rest, there was a slight drop: My patron directs me on the kind of screw to use to tighten the nodes of the car: The mean was 2.50 at pretest and dropped at 2.33 at posttest. My patron provides me with reminders to locate particular faults in the car: The mean was 2.50 at pretest and dropped at 2.33 at posttest. Feedback is always given to apprentices after diagnosing problems in the car by the instructor: The mean was 1.67 at pretest and dropped at 1.00 at posttest. In overall, there was a slight dropped in mean from 9.6 at pretest to 9.5 at posttest but this increase was not significant (positive Cohen's d) thus implying no significant change from pretest to posttest.

Comparing between workshop 1 & 2

Productive learning	Workshop 1	Workshop 2	Mean difference	Calculated Effect Size	Theoretical Effect Size
Progression	1.3	1.7	0.4	1.266	0.721
SD	0.331	0.41	0.316		

The theoretical effect size is bigger than the calculated one, we then conclude that the means are not significantly different between the workshops for scaffolding.

Mechanic workshop 1 & 2

Table: Comparing change in score in scaffolding from pretest to posttest in the experimental group for apprentices in mechanic workshops 1 & 2

		Test Level		Mean difference
		Pretest	Posttest	
My patron direct me on the kind of screw to use to tighten the nodes of the car	N	6	6	
	Mean	1.00	2.33	1.3
	Median	1.00	1.00	
	Std. Deviation	0.361	0.328	
My patron assist me on how to hold the brake of the car when there is a fault	N	6	6	
	Mean	1.33	2.00	0.7
	Median	1.00	2.00	
	Std. Deviation	0.426	0.359	
My patron provide me with reminders to locate particular faults in the car	N	6	6	
	Mean	3.00	2.67	0.7
	Median	2.00	1.00	
	Std. Deviation	0.345	0.456	
Directives is being given to novices to check the engine of the car	N	6	6	
	Mean	1.33	3.00	1.67
	Median	1.00	1.00	
	Std. Deviation	0.325	0.233	
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	N	6	6	
	Mean	2.00	2.00	0.0
	Median	1.00	1.00	
	Std. Deviation	0.225	0.333	
Total score scaffolding	N	6	6	
	Mean	9.0001	10.4325	1.4
	Median	7.0000	7.0670	
	Std. Deviation	0.456	0.358	
	SD_g	0.333		
	Calculated Effect Size	4.204		
	Theoretical Effect Size	3.589		
	Interpretation (Cohen's *d*)	The theoretical effect size is smaller than the calculated one, We then reject the hypothesis that the means are not different. This therefore implies that there was a significant progression from pre-test to post-test.		

An increase in the quality of scaffolding was realized from pretest to posttest in the experimental group for both mechanic workshops for 4 indicators out of the: My patron directs me on the kind of screw to use to tighten the nodes of the car: The mean was 1.00 at pretest and rose to 1.33 at posttest. My patron assists me on how to hold the brake of the car when there is a fault: The mean was 1.33 at pretest and rose to 2.00 at posttest. My patron provides me with reminders to locate particular faults in the car: The mean was 2.00 at pretest at rose to 2.67 at posttest. Directives were being given to novices to check the engine of the car: The mean was 1.33 at pretest and rose to 3.00 at posttest. As for the indicator 'feedback is always given to apprentices after diagnosing problems in the car by the instructor', the mean stagnated at 2.0 from pretest to posttest. As for the total score in scaffolding for mechanic in the experimental group, the mean at pretest was 9.0 and rose to 10.4 at posttest and this increase was significant (negative Cohen's *d*).

Table: Comparing change in score in scaffolding from pretest to posttest in the control group for apprentices in mechanic workshops 1 & 2

		Test Level		Mean difference
		Pretest	Posttest	
My patron direct me on the kind of screw to use to tighten the nodes of the car	N	6	6	
	Mean	2.00	2.00	0.0
	Median	1.00	1.00	
	Std. Deviation	0.151	0.120	
My patron assist me on how to hold the brake of the car when there is a fault	N	6	6	
	Mean	1.67	1.00	-0.67
	Median	1.00	1.00	
	Std. Deviation	0.321	.297	
My patron provide me with reminders to locate particular faults in the car	N	6	6	
	Mean	2.50	2.33	-0.17
	Median	1.00	1.00	
	Std. Deviation	0.410	0.367	
Directives is being given to novices to check the engine of the car	N	6	6	
	Mean	1.00	1.67	0.67
	Median	1.00	1.00	
	Std. Deviation	0.124	0.220	
Feedback is always given to apprentices after diagnosing problems in the car by the instructor	N	6	6	
	Mean	1.67	1.00	-0.67
	Median	1.00	1.00	
	Std. Deviation	0.224	0.120	
Total score scaffolding	N	6	6	
	Mean	8.2000	9.0100	-0.9
	Median	7.0000	7.000	
	Std. Deviation	0.523	0.641	
	SD_g	0.521		
	Calculated Effect Size	1.727		
	Theoretical Effect Size	3.589		
	Interpretation*	The theoretical effect size is bigger than the calculated one. We then accept the hypothesis that the means are not different. This therefore implies that there was no significant progression from pre-test to post-test.		

In the control group for scaffolding in both mechanic workshops, a slight increase from pretest to posttest was observed for one indicator, that is 'Directives is being given to novices to check the engine of the car' whereby the mean was 1.00 at pretest and rose to 1.67 at posttest. The mean stagnated for 1 indicator: My patron directs me on the kind of screw to use to tighten the nodes of the car: the mean was 2.00 at pretest and stagnated at posttest. There was a drop in mean for two indicators: My patron assists me on how to hold the brake of the car when there is a fault: The mean was 1.67 at pretest and dropped at 1.00 at posttest. My patron provides me with reminders to locate particular faults in the car: The mean was 2.50 at pretest and dropped at 2.33 at posttest. Feedback is always given to apprentices after diagnosing problems in the car by the instructor: The mean was 1.67 at pretest and dropped at 1.00 at posttest. In overall, there was a slight dropped in mean from 8.2 at pretest to 9.0 at posttest but this drop was not significant (positive Cohen's d) thus implying no significant change from pretest to posttest.

Conclusion on research hypothesis two

As for the total score in coaching for mechanics in the experimental group, the mean at pretest was 9.0 and rose to 10.4 at posttest and this increase was significant (negative Cohen's d). In fact, the theoretical effect size is smaller than the calculated one, we then reject the hypothesis that the means are not different. This therefore implies that there was a significant progression from pre-test to post-test.

Concerning the outcome variable which is productive learning, as for the total for mechanic in the experimental group, the mean at pretest was 9.7 and rose to 13.4 at posttest and this increase was significant (negative Cohen's d). This significant improvement in productive learning score was as the result of improvement in scaffolding because such improvement was not obtained in the control group where no significant improvement was realized in coaching from pretest to posttest.

The hypothesis here stated is then accepted.

Summary of findings

Table: Summary of findings

Research hypotheses	Statistical test used	Comments
Research hypothesis one: There is no significant relationship between scaffolding and productive learning among emerging adults engaged in tailoring and mechanic work in Buea Municipality.	(Cohen's *d*): If the theoretical effect size is smaller than the calculated one, we then reject the hypothesis that the means are not significantly different at 90% power and at 95% CL with cohort sample 3 and a total sample size 6 as it is the case in our study context.	As for the total score in scaffolding for mechanics in the experimental group, the mean at pretest was 9.0 and rose to 10.4 at posttest and this increase was significant (negative Cohen's d). In fact, the theoretical effect size is smaller than the calculated one, we then reject the hypothesis that the means are not different. This therefore implies that there was a significant progression from pre-test to post-test. Concerning the outcome variable which is productive learning, as for the total for mechanic in the experimental group, the mean at pretest was 9.7 and rose to 13.4 at posttest and this increase was significant (negative Cohen's d). This significant improvement in productive learning score was as the result of improvement in scaffolding because such improvement was not obtained in the control group where no significant improvement was realized in coaching from pretest to posttest. The hypothesis here stated is then accepted

DISCUSSION

Scaffolding and productive learning among out-of-school emerging adults engaged in mechanic work

Equally important, as concerned the second hypothesis, as for the total score in scaffolding for mechanics in the experimental group, the mean score at the pretest was low but rose to at posttest and the increase was significant progression posttest same with productive learning as scaffolding was concerned. As for the total score in coaching for mechanics in the experimental group, the mean at pretest was low but rose at posttest and this increase was significant (negative Cohen's d). This finding is in accordance with Wilson (1993) who asserts that scaffolding is based on Vygotsky concept of the Zone of Proximal Development (ZPD) which he defined as the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance. Similarly, Vygotsky in his socio cultural theory (1978) proposed the construct of the zone of proximal development he defined as the distance between the learner's actual development levels as determined by independent problem solving and the higher level of problem solving known as potential development as determined through problem solving under adult guidance or in collaboration with more capable peers (Vygotsky, 1978). Giving the value of assisted performance in helping a novice to make progress while in the zone the utility of scaffolding is made manifest.

In like manner, a lower proportion of masters in mechanic workshop 1 had average coaching skills at pretest in the experimental group and this proprotion rose at posttest following the intervention. In the control group, this proprotion was below average at pretest and almost stagnated at posttest. As for masters in mechanic workshop 1, in the experimental group, the progression rate was better than that of the control group. The progression was as a result of scaffolding. This is in line with (Greenfield, 1984) who opined that scaffolding has five salient characteristics, it provides support, it functions as a tool, it extends the range of the worker, it allows the worker to accomplish a task, and it is used to aid the worker where need be. The findings concur with Collins (1991) who cited several benefits for placing instruction within problem solving contexts in cognitive apprenticeship. First, Learners learn to apply their knowledge under appropriate conditions. Therefore, problem solving situation foster invention and creativity (Perkins, 1990). Henceforth, knowledge is stored in ways that make it accessible when solving problems for people to retrieve knowledge more easily when they return to the setting of its acquisition. Therefore, knowledge learned while solving problems gets encoded in a way that can be accessed gain in problem solving situations. This finding is in concurrence with Collins et al., (1990) who argued that cognitive teaching models are relevant to the notion of situated learning which was developed in an approached known as anchored instruction. Thus, this instruction is grounded in a rich macro-context that is meaningful and interesting.

Furthermore, apprentice easily select right screw of untightening a car when provided assistance, apprentice do connect parts of the car perfectly when provided support. Participant find it easy to remove the tire of the car even after support. participants do solve some heating problems faced by the car when provided cues receiving feedback, apprentice do use the right screw to work on the car when self-directed by the expert. The findings match with (Lave, 1991; Palincsar, 1986) who opine that support in the form of dialogue, discussion, demonstration is found effective in enabling cognitive change, the expert is conceived as providing scaffolding assistance through modelling, contingency, management, cognitive structuring and feedback (Tharp & Gathimore, 1988). Through modelling, tasks, skills and concepts can be demonstrated while retaining complexity and authenticity so that learners can become engaged in the acquisition of new skills. Likewise, (Diaz, Neal & Amaya-William, 1990) agree that for learners to move toward self-sufficiency, there must initially be an external (adult) regulation of the learning activity, following by the learner's redefinition of the activity followed by a shifting of responsibility. It should be noted that learners in cognitive apprenticeship are engaged in acts of observation, practice, and reflections (Collins et al. 1989). The findings are in concurrence with (Vygotsky, 1978; Wood, Bruner & Ross, 1976) who see Scaffolded instruction as conceived as a joint interaction in which the expert and the novice share responsibility for learning. Scaffolding therefore involves mediation where learners attain new skills, concepts and knowledge.

A proprotion below average of mechanic apprenctcies in workshop 1 had good response to scaffolding at pretest in the experimental group and this proprotion rose at posttest following the intervention. In the control group, this proprotion was below average at pretest and rose slightly at at posttest. As for apprentice mechanics in workshop 1, and in the experimental group, there was a progression rate was better than that of the control group. The finding is in light with Rasku-Puttonen et al., (2003) who asserted that learners need extensive support when working on long-term problem-based learning activities as well as ample opportunities for reflection. Scaffolding therefore help learners to become self-regulated learners (Tuner, 2002). In fact, learners need scaffolding in order to structure tasks as to fit it in to the learners' zone of proximal development (Sugar & Bonk, 1998). T

Moreover, a lower proportion of masters mechanic in workshop 2 had good scaffolding at pretest in the experimental group and this proprotion rose extremely at posttest following the intervention.In the control group, the proportion was low but rose at posttest. As for masters in mechanic in workshop 2, in the experimental group, the progression rate was greater than that of the control group. A proprotion moderate of mechanic apprenctces in workshop 2 had good response to scaffolding at pretest in the experimental group and this proprotion rose at posttest following the intervention. In the control group, this proprotion was below average at pretest and rose slightly at posttest. There was no significant difference between the two workshops for both masters and mechanics ($P>0.05$). A proprotion of 30.0% of master mechanic workshops 1 & 2 had good scaffolding at pretest in the experimental group and this proprotion rose to a greater extent at posttest following the intervention. As for master mechanics in workshops 1 & 2, in the experimental group, there was a progression rate of 60% as against 10% in the control group. The finding is in line with the assertion of (Tharp & Gallimore, 1988) who state, verbal scaffolding such as questioning, instructing and cognitive structuring, that is, (Cognitive structures here refers to the patterns use by people to process information which involves symbolic representation of the mental process to encode, store and retrieve information) enable learners to organize their own thought activities by suggesting meta strategies that learners acquire so that expert support begins. Scaffolding therefore address the needs of learners but bring about the learners together as a community with a common goal all working within the zone of proximal development (Groos et al., 2002). Scaffolding therefore provides a collaborative learning space, where the expert acts as a facilitator and the novice is tasked with communicating and creating knowledge objects which therefore engage learners in authentic tasks and scaffolding is provided in the form of task assistance and hints as needed (Schank et al., 1999).

Moreover, there was a significant progression from pre-test to post-test. Concerning the outcome variable which is productive learning, as for the total for mechanic in the experimental group, the mean at pretest was moderate and rose slightly at posttest and this increase was significant (negative Cohen's d). This significant improvement in productive learning score was as the result of improvement in scaffolding because such improvement was not obtained in the control group where no significant improvement was realized in coaching from pretest to posttest. The findings are in line with Lave & Wenger (1991) communities of practice and situated learning theory who looked at how apprenticeship help people learn, they found that when newcomers, join an established group or community, they spend time initially observing and perhaps performing simple tasks in basic roles as they learn how the group works and how they participate. Lave & Wenger (1991) described this socialization process as legitimate peripheral participation where group share common interest and a desire to learn from and contribute to the community with their variety of experiences. Lave (1998) describe the structure of community of practice as consisting of three interrelated terms; mutual engagement, joint enterprise and shared repertoire

Conclusion

To conclude, the study attempted to investigate on the concept of cognitive apprenticeship and the development of productive learning skills among emerging adults (18-25) engaged mechanic work in the informal sector. From the findings, trainers in the experimental group as they were trained, they reinforce their scaffolding pedagogically that lead to productive learning among apprentice. Apprentice therefore need constant assistance, hints, feedback, cues, directives to enhance their productivity. Therefore, scaffolding is necessary to close the gaps at the zone of proximal development for apprentice to gain abilities and skills when mediated. Finally, from the findings, when the trainer provokes the minds of apprentice to engage in task accomplishment on their own, they learn how to solve problem, plan and think creatively in order to do assignments given by the trainers.

REFERENCES

[1] Anderson, J. R. (1983). The architecture of cognition. Cambridge, MA: Havard University Press.

[2] Arnett, J. J. (l 998). Learning to stand alone: The contemporary American transition to adulthood in cultural and historical context. Human Development, 41: 295-315.

[3] Arnett, J. J. (2000a). Emerging adulthood: A theory of development from the late teens through the twenties. American Psychologist, 55: 469–480.

[4] Arnett, J., & Taber, S. (1994). Adolescence terminable and interminable: When does adolescence end? Journal of Youth & Adolescence, 23.

[5] Arnett, J.J. (2004). Adolescence in the twenty-first century: A worldwide survey. In U.P. Gielen & J. Roopnarine (Eds.), Childhood and adolescence: Cross-cultural perspectives and applications. Westport, CT: Praeger.

[6] Arnett, J.J., Ramos, K.D., & Jenson, L.A. (2001). Ideological views in emerging adulthood: Balancing autonomy and community. Journal of Adult Development, 8(2): 69-79.

[7] Bandura, A. (1977). Social learning theory. Nww York: General Learning Press.

[8] Brill, J., B., & Galloway, C. (2001) Cognitive Apprenticeship as an instructional model. In M. Oney (Ed.) Emerging perspectives on learning, teaching, technology.

[9] Bakhtin, M. M. (1981). The dialogical imagination (M. Holquist, Ed.). Austin: University of Texas Press.

[10] Brown, A. (1993). Expertise in the Classroom, in Saloman, G. (Ed.) Distributed Cognition. Cambridge: Cambridge University Press.

[11] Brown, A. Evans, K. Blackman, S. and Germon, S. (1994). Key Workers Technical Training and Mastery in the Workplace. Bournemouth, UK: Hyde.

[12] Brown, A. L. & Campione, J. C. (1994). Guided discovery in community of learners. In J. McGilly (Ed.), Classroom lessons: integrating cognitive theory (pp. 229-270). Cambridge, Mass.: MIT Press.

[13] Brown, A. L. (1985). Metacognition: The development of selective attention strategies for learning from texts. In H. Singer & R. B. Ruddell (Eds.), Theoretical models and processes of reading (3rd ed., pp. 501-526). Newark, DE: International Reading Association.

[14] Brown, A. L. (1987). Metacognition, executive control, self-regulation, and other mysterious mechanisms. In F. K. Weinert, R. (Ed.), Metacognition, Motivation, and Understanding. New Jersey: Lawrence Erlbaum.

[15] Brown, A. L. (1994). The advancement of learning. Educational Researcher, 23(8), 4-12.

[16] Brown, A. L. (1997). Transforming schools into communities of thinking and learning about serious matters. American Psychologist, 52(4), 399-413.

[17] Brown, A. L. and Palincsar, A. S. (1989). Guided, cooperative learning and individual knowledge acquisition. In L. Resnick (Ed.), Knowing, Learning, and Instruction: Essays in Honor of Robert Glaser (pp. 393-451). Hillsdale: NJ: Lawrence Erlbaum Associates.

[18] Brown, A. L., & Campione, J. C. (1996). Guided discovery in a community of learners. In K. McGilly (Ed.), Classroom lessons: Integrating cognitive theory and classroom practice (pp. 229-325). Cambridge, MA: MIT Press/Bradford Books.

[19] Brown, A. L., & Campione, J. C. (1996). Psychological learning theory and the design of innovative environments: On procedures, principles, and systems. In L. Schauble & R. Glaser (Eds.), Contributions of instructional innovation to understanding learning (pp. 289-325). Hillsdale, NJ: Lawrence Erlbaum.

[20] Brown, A. L., & Campione, J. C. (1998). Designing a community of young learners: Theoretical and practical lessons. In N. M. Lambert & B. L. McCombs (Eds.), How students learn: Reforming schools through learner-centered education (pp. 153-186). Washington, DC: American Psychological Association.

[21] Brown, A. L., & Palincsar, A. S. (1989). Guided, cooperative learning and individual knowledge acquisition. In L. B. Resnick (Ed.), Knowing, learning, and instruction: Essays in honor of Robert Glaser (pp. 393–451). Hillsdale, NJ: Lawrence Erlbaum Associates.

[22] Brown, A. L., Ash, D., Rutherford, M., Nakagawa, K., Gordon, A., & Campione, J. C. (1993). Distributed expertise in the classroom. In G. Salomon (Ed.), Distributed cognitions: Psychological and educational considerations (pp.188-228). Cambridge, Eng. & New York: Cambridge University Press.

[23] Brown, A., Bransford, J., Ferrara, R., & Campione, J. (1983). Learning, remembering, and understanding. In P. H. Mussen (Ed.), Handbook of child psychology (Vol. 3, 4th ed., pp. 77-166). New York, NY: John Wiley & Sons, Inc.

[24] Brown, J. Collins, S. Duguid, P. (1989). Situated Cognition and Culture of Learning. Educational Researcher, 18.

[25] Brown, J. S. (1985). Idea-amplifiers: New Kinds of Electronic Learning. Educational Horizons, 63: 108-112.

[26] Brown, J. S. (1985b). Process versus product: A perspective on tools for communal and informal electronic learning. Journal of Educational Computing Research, 1(2): 179–201.

[27] Brown, J. S. (1990). Toward a new epistemology for learning. In C. Frasson and G. Gauthier (Eds.), Intelligent Tutoring Systems: At the Crossroads of Artificial Intelligence and Education (pp. 266-282).

[28] Brown, J. S. (1998). Internet technology in support of the concept of communities-of-practice: The case of Xerox. Accounting, Management and Information Technology, 8: 227–236.

[29] Brown, J. S. and Duguid, P. (1993). Stolen knowledge. Educational Technology, 33 (3): 10-15.

[30] Brown, J. S. and Duguid, P. (2000). The social life of information. Boston: Harvard Business School Press.

[31] Brown, J. S., Collins, A., and Duguid, P. (1989). Situated Cognition and the Culture of Learning. Educational Researcher, 18(l), 32-42.

[32] Brown, K., & Cole, M. (2000). Socially shared cognition: System design and the organization of collaborative research. In In D. Jonassen and S. Land (Eds.), Theoretical foundations of learning environments (pp.197-214). Mahwah, N.J. : L. Erlbaum Associates.

[33] Collins, A. (1986). Teaching Reading and Writing with Personal Computers. In J. Orasanu (Ed.), A decade of reading research: implications for practice. Hillsdale, NJ: Erlbaum.

[34] Collins, A. (1988). Cognitive apprenticeship and instructional technology. (Technical Report). Cambridge, MA: Bolt, Beranck, and Newman. (ERIC Document Reproduction Service No. ED 331 465)

[35] Collins, A. (1991). Cognitive apprenticeship and instructional technology. In L. Idol & B.F. Jones (Eds.), Educational values and cognitive instruction: Implications for reform. Hillsdale, NJ: Erlbaum.

[36] Collins, A. and Brown, J. S. (1988). The computer as a tool for learning through reflection. In H. Mandl and A. Lesgold (Eds.), Learning issues for intelligent tutoring systems (pp. 1-18). Berlin: Springer-Verlag.

[37] Collins, A. Brown, J. S., & Newman, S. E. (1986). Cognitive apprenticeship: Teaching the craft of reading, writing, and mathematics (Technical report No. 403). Cambridge, MA: Bolt, Berank, and Newman. (ERIC Document Reproduction Service No, ED 284 181)

[38] Collins, A., & Smith, E. E. (1982). Teaching the Process of Reading Comprehension. In D. K. Detterman and R.J.

Sternberg (Eds.), How much and how can intelligence be increased? Norwood, NJ: Ablex.

[39] Collins, A., & Stevens, G. (1983). Inquiry teaching. In C. M. Reigeluth (Ed.), Instructional-design theories and models: An overview of their current status. Hillsdale, NJ: Erlbaum.

[40] Collins, A., and Stevens, A.L. (1982). Goals and Strategies of Inquiry Teachers. In R. Glaser (Ed.), Advances in Instructional Psychology (Vol. 2). Hillsdale, NJ: Erlbaum.

[41] Collins, A., and Stevens, A.L. (1983). A Cognitive Theory of Interactive Teaching. In C.M. Reigeluth (Ed.), Instructional design theories and models, (P. 18). An Overview. Hillsdale, NJ: Erlbaum.

[42] Collins, A., Brown, J. S. and Newman, S. E. (1989). Cognitive apprenticeship: Teaching the crafts of reading, writing, and mathematics. In L. B. Resnick (Ed.), Knowing, learning and instruction: Essays in Honor of Robert Glaser (pp. 453-494). Hillsdale, NJ: Lawrence Erlbaum.

[43] Collins, A., Brown, J. S., & Duguid, P. (1989). Situated cognition and the culture of learning. Institute of for Research on Learning (IRL 88-0008). Bolt, Beranek & Newman.

[44] Collins, A., Brown, J. S., & Holum, A. (1991). Cognitive apprenticeship: Making thinking visible. American Educator: The Professional Journal of the American Federation of Teachers, 15(3): 6-11, 38-46.

[45] Collins, A., Brown, J. S., and Newman, S. E. (1987). Cognitive apprenticeship: teaching the craft of reading, writing and mathematics. Technical Report No. 403.Center for the Study of Reading, University of Illinois at Urbana-Champaign, Champaign, IL, USA

[46] Collins, A., Brown, S, J., & Newman, S, E. (1989). Cognitive Apprenticeship. In L. B. Resnick (Ed), Knowledge, Learning and Interaction Essays in Honour of Robert Glaser. USA: Erlbaum, New Jersey Press.

[47] Darling-Hammond, L. Austin, K. Cheug, M. Lit, I. & Martin, D. (2006). Cognitive Apprenticeship and Metacognition.

[48] Darling-Hammond, L. (1997). The right to learn: A blueprint for creating schools that work. San Francisco: Jossey-Bass Publishers.

[49] Ding, H. (2005). The use of Cognitive and social apprenticeship to teach a disciplinary genre. Written communication, 25 (1), 3-52.

[50] Enkenberg, J. (2001). Instructional design and emerging models in higher education. Computers in Human Behavior, 17: 495–506.

[51] Ennis, R. H. (1985). A logical basis for measuring critical thinking skills. Educational Leadership, 43(2), 44-48.

[52] Flavell, J. H. (1971). First discussant's comments: What is memory development the development of? Human Development, 14: 272-278.

[53] Flavell, J. H. (1976). Metacognitive aspects of problem solving, In L. B. Resnick (Ed), The Nature of Intelligence (pp. 231-235). New Jersey: Lawrence Erlbaum.

[54] Flavell, J. H. (1977). Cognitive development. Englewood Cliffs, NJ: Prentice-Hall Publishing.

[55] Flavell, J. H. (1978). Metacognitive development. In J. M. Scandura & C. J. Brainerd (Eds.), Structural/process theories of complex human behavior (pp. 213-245). Alphen aan den Rijn, the Netherlands: Sijthoff and Noordhoff.

[56] Gibbons, A.S. (1996). New Techniques for an old profession.

[57] Hockly, N. (2000). Modelling and Cognitive Apprenticeship in teacher education. ELT Journal 54 (2), 118-125/

[58] Lave, J. (1988). Cognition in practice. New York: Cambridge University Press.

[59] Lave, J. (1988). Cognition in practice: mind, mathematics, and culture in everyday life. Cambridge University Press.

[60] Lave, J. (1988). The culture of acquisition and the practice of understanding. (Report No. IRL88-0007). Palo-Alto, CA: Institute for Research on Learning.

[61] Lave, J. (1993). The Practice of Learning. In Chaiklen, S. and Lave, J (Eds). Understanding Practice. UK: Cambridge University Press.

[62] Lave, J. (1996) Teaching, as learning, in practice. Mind, Culture and Society, 3 (3).

[63] Lave, J. and Wenger, E. (1991). Situated Learning. UK: Cambridge Press.

[64] Liu, T.C (2005). Web-based Cognitive Apprenticeship Model for improving pre-service teachers performance and attitudes towards instructional planning: Design and field experiment. Educational technology and society, 8 (2), 136-149.

[65] Malone, T. (1981). Toward a Theory of Intrinsically Motivating Instruction. Cognitive Science, 4, 33

[66] Martinez, M. E. (2006). What is metacognition? Phi Delta Kappan, 696-699.

[67] Mezirow, J. (1990). How critical reflection triggers transformative learning. In J.

[68] Nsamenang, A.B (2007. A critical peek at early childhood care and education in Africa, Childhealth and Education, 1 (1), 14-26.

[69] Preskill, H. & Torres, R.T. (1999). Evaluative inquiry for learning in organization. Thousand Oaks, Ca: Sage.

[70] Patel, A.K. & Russell, D. (2002). Implementing cognitive apprenticeship and conversation theory in interactive web-based learning systems. In N. Callaous, M. Loutfl, & M. Justan (Eds) Sixth multi conference on systemics and informatics (July) 14-18, 2002, Olando, Florida of informatics and systemics, 523-528 (ISBN.980-07-8150-1).

[71] Rogoff, B. & Lave, J. (Eds.) (1988). Everyday cognition: its development in social context. Cambridge, MA: Harvard University Press.

[72] Rogoff, B. (1984). Introduction: Thinking and learning in social context. In B. Rogoff & J. Lave (Eds.), Everyday

cognition: Its development in social context (pp.1-8). Cambridge, MA: Harvard University Press.

[73] Rogoff, B. (1990). Apprenticeship in thinking: Cognitive development in social context. New York: Oxford University Press.

[74] Rogoff, B. (1992). Three ways to relate person and culture: Thoughts sparked by Valsiner's review of Apprenticeship in Thinking. Human Development. 35: 316- 320.

[75] Rogoff, B. (1993). Children's guided participation and participatory appropriation in sociocultural activity. In R. Woxniak & K. Fischer (Eds.), Development in context: Acting and thinking in specific environments (pp. 121-153). Hillsdale, NJ: Erlbaum.

[76] Rogoff, B., & Gardner, W. P. (1984). Adult guidance of cognitive development. In B. Rogoff & J. Lave (Eds.), Everyday cognition: Its development in social context (pp. 95-116). Cambridge, MA: Harvard University Press.

[77] Rogoff, B., & Lave, J. (Eds.). (1984). Everyday cognition: Its development in social context (pp. 95 - 116). Cambridge, MA: Harvard University Press.

[78] Rogoff, B., Mistry, J. J., Goncu, A., & Mosier, C. (1993). Guided participation in cultural activity by toddlers and caregivers. Monographs, of the Society for Research in Child Development, 58 (7, Serial No. 236).

[79] Rogoff, B., Radisewska, B., & Masiello, T. (in press). The analysis of developmental processes in sociocultural activity. In L. Martin, K. Nelson, & E. Tobach (Eds.), Cultural psychology and activity theory. Cambridge University Press.

[80] Seitz, R. (1999). Cognitive apprenticeship (November 2006).

[81] Scribner, S. (1985). Vygotsky's uses of history. In J. V. Wertsch (Ed.), Culture, communication, and cognition: Vygotskian perspectives (pp. 119-145). Cambridge University Press.

[82] Vrasidas, C., Zembylas, M., & Chamberlain, R. (2004). The design of online learning communities: Critical issues. Educational Media International. 41(2): 135-142.

[83] Vygotsky, L. S. (1962). Thought and Language. Cambridge, MA: MIT Press

[84] Vygotsky, L. S. (1977). The development of higher psychological functions. Soviet Psychology, 16: 60–73.

[85] Vygotsky, L. S. (1978). Mind and society: The development of higher mental processes. Cambridge, MA: Havard University Press.

[86] Vygotsky, L. S. (1978). Mind in society. UK: Cambridge University Press.

[87] Vygotsky, L. S. (1987). The Collected Works of L. S. Vygotsky, Volume 1: Problems of general psychology. R. W. Rieber & A. S. Carton (Eds.). NY: Plenum Press.

[88] Vygotsky, L. S. (1987). Thinking and speech. In R. W. Rieber & A. S. Carton (Eds.), The collected works of L. S. Vygotsky (N. Minick, Trans.) (pp. 37-285). New York: Plenum.

[89] Vykotsky, L. S. (1981). The Genesis of Higher Mental Functions. In V. Wertsch (Ed), The concept of activity in Soviet Psychology. New York: Armong, Sharpe.

[90] Walkins, K.E & Marsick, V.J (1993). Sculpting a learning organization. San Fransico: Jossey. Bass.

[91] Wilson, B.G. Jonanessen, D.H., & Cole, P (1993). Cognitive approaches to instructional design. October (2006).

Appendices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